

# Final Construction Work Plan

## Installation of Interim Emergency Treatment Liquid-Phase Granular Activated Carbon Units

Aqua New York, Inc.  
Seamans Neck Road Water Plant  
NWIRP Bethpage, New York

Revision No. 01

Contract No. N62470-08-D-1006  
Task Order No. WE23

Prepared for:



U.S. Naval Facilities  
Engineering Command  
Mid-Atlantic Division

Prepared by:



1000 Abernathy Road  
Suite 1600  
Atlanta, GA 30328

February 2012

Final Construction Work Plan  
Installation of Interim Emergency Treatment  
Liquid-Phase Granular Activated Carbon Units

Aqua New York, Inc. Seamans Neck Road Water Plant  
NWIRP Bethpage, New York

Revision No. 01

Contract No. N62470-08-D-1006  
Task Order No. WE23

Submitted to:



U.S. Naval Facilities  
Engineering Command  
Engineering Field Division Mid-Atlantic

Prepared by:



1000 Abernathy Road  
Suite 1600  
Atlanta, GA 30328

February 2012

Prepared/Approved By

  
\_\_\_\_\_  
Jim Nicotri, Project Manager

February 8, 2011

\_\_\_\_\_  
Date

Approved By:

  
\_\_\_\_\_  
Michael Halil, Deputy Program Manager

February 9, 2011

\_\_\_\_\_  
Date

Client Acceptance:

\_\_\_\_\_  
Lora Fly, Navy Technical Representative (NTR)

\_\_\_\_\_  
Date

# Contents

---

|  |            |
|--|------------|
| <b>Acronyms and Abbreviations .....</b>                              | <b>iii</b> |
| <b>1.0 Introduction.....</b>   | <b>1-1</b> |
| 1.1 Project Background .....   | 1-1        |
| 1.2 Work Plan Organization.....                                      | 1-2        |
| <b>2.0 Objectives and Scope of Work.....</b>                         | <b>2-1</b> |
| 2.1 Objectives.....  | 2-1        |
| 2.2 Scope of Work.....   | 2-1        |
| <b>3.0 Project Organization .....</b>                                | <b>3-1</b> |
| 3.1 Project Team.....  | 3-1        |
| 3.2 Roles and Responsibilities.....                                  | 3-1        |
| 3.2.1 Project Manager – Jim Nicotri .....                            | 3-1        |
| 3.2.2 Senior Construction Manager – Steve Matney.....                | 3-1        |
| 3.2.3 Senior Technical Consultant – Russell Ford .....               | 3-1        |
| 3.2.4 Construction Manager/Site Superintendent – Randy Grogan....    | 3-2        |
| 3.2.5 Project QC Manager/ Site Safety Coordinator – Don Conger ..... | 3-2        |
| <b>4.0 Description of Activities .....</b>                           | <b>4-1</b> |
| 4.1 Interim Emergency LPGAC System .....                             | 4-1        |
| 4.1.1 Pre-Mobilization Coordination .....                            | 4-1        |
| 4.1.2 Mobilization .....   | 4-2        |
| 4.1.3 Site Preparation.....  | 4-2        |
| 4.1.4 Underground Piping and Utilities .....                         | 4-2        |
| 4.1.5 Concrete Work .....  | 4-4        |
| 4.1.6 Process Equipment, Piping and Valves.....                      | 4-4        |
| 4.1.7 System Startup-Up .....  | 4-5        |
| 4.1.8 Testing.....   | 4-6        |
| 4.1.9 Demobilization .....   | 4-6        |
| 4.1.10 System Operations and Maintenance.....                        | 4-7        |
| 4.1.11 Temporary LPGAC System Removal.....                           | 4-7        |
| 4.2 Closeout Documentation.....                                      | 4-7        |
| 4.2.1 Operations and Maintenance Plan.....                           | 4-7        |
| 4.2.2 Construction Completion Report.....                            | 4-7        |
| <b>5.0 Accident Prevention and Quality Control Plans .....</b>       | <b>5-1</b> |
| 5.1 Accident Prevention Plan.....                                    | 5-1        |
| 5.2 Quality Control Plan.....  | 5-1        |
| <b>6.0 Environmental Protection Plan.....</b>                        | <b>6-1</b> |
| 6.1 Specific Environmental Requirements .....                        | 6-1        |
| 6.1.1 Erosion and Sediment Control Measures .....                    | 6-1        |
| 6.1.2 Stormwater Management.....                                     | 6-1        |
| 6.1.3 Groundwater Pollution Prevention .....                         | 6-1        |
| 6.1.4 Hazardous Material Management .....                            | 6-1        |

|            |   |            |
|------------|---|------------|
| 6.2        | Natural Resources Protection .....                          | 6-2        |
| 6.2.1      | Protection of Fish and Wildlife.....                        | 6-2        |
| 6.2.2      | Protection of Land Resources .....                          | 6-2        |
| 6.2.3      | Protection of Water Resources.....                          | 6-3        |
| 6.2.4      | Protection of Air Resources.....                            | 6-3        |
| 6.2.5      | Protection of Historical and Archaeological Resources ..... | 6-3        |
| 6.3        | Spill Prevention, Response, and Reporting Requirements..... | 6-3        |
| 6.3.1      | Spill Prevention .....                                      | 6-4        |
| 6.3.2      | Spill Containment and Control .....                         | 6-4        |
| 6.3.3      | Spill Cleanup and Removal .....                             | 6-5        |
| <b>7.0</b> | <b>Waste Management Plan.....</b>                           | <b>7-1</b> |
| 7.1        | Exemptions and Exclusions .....                             | 7-1        |
| 7.2        | Waste Characterization.....                                 | 7-2        |
| 7.2.1      | Waste Profile .....   | 7-2        |
| 7.3        | General Waste Management Requirements .....                 | 7-2        |
| 7.3.1      | Containment.....  | 7-3        |
| 7.3.2      | Waste Storage Time Limit .....                              | 7-4        |
| 7.3.3      | Labels .....  | 7-4        |
| 7.3.4      | Inspections.....  | 7-5        |
| 7.4        | Security/Emergency Response .....                           | 7-5        |
| 7.5        | Employee Training.....                                      | 7-5        |
| 7.6        | Waste Transportation.....                                   | 7-6        |
| 7.6.1      | Shipping Documentation .....                                | 7-6        |
| 7.7        | Department of Transportation Requirements .....             | 7-6        |
| 7.7.1      | Shipping Name .....   | 7-7        |
| 7.7.2      | Packaging, Marking, and Labeling .....                      | 7-7        |
| 7.7.3      | Placards.....   | 7-7        |
| 7.7.4      | Shipping Spent GAC.....                                     | 7-7        |
| 7.8        | Transporter Requirements .....                              | 7-8        |
| 7.9        | Disposal of Waste Streams .....                             | 7-8        |
| 7.9.1      | Recordkeeping.....  | 7-9        |
| <b>8.0</b> | <b>References .....</b>                                     | <b>8-1</b> |

## Figures

- 2-1 Project Schedule
- 4-1 Contractor Staging Area

## Appendixes

- A Accident Prevention Plan
- B Quality Control Plan
- C Tetra Tech NUS, Inc. Interim LPGAC System Design Specifications
- D Tetra Tech NUS, Inc. Interim LPGAC System Design Drawings

# Acronyms and Abbreviations

---

|                 |   |
|-----------------|---|
| AGVIQ-CH2M HILL | AGVIQ-CH2M HILL Constructors, Inc. Joint Venture III                  |
| APP             | Accident Prevention Plan  |
| AQUA-NY         | Aqua New York, Inc.   |
| C&D             | Construction and Demolition Debris                                    |
| CAD             | Computer Aided Design   |
| CERCLA          | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR             | Code of Federal Regulations   |
| CO              | Contracting Officer   |
| DIP             | ductile iron pipe   |
| DOT             | U.S. Department of Transportation                                     |
| EM              | Environmental Manager   |
| EPA             | U.S. Environmental Protection Agency                                  |
| EPP             | Environmental Protection Plan   |
| ESCP            | Erosion and Sediment Control Plan                                     |
| GAC             | granular activated carbon   |
| GC              | General Contractor  |
| gpm             | gallons per minute  |
| GPP             | Groundwater Pollution Prevention                                      |
| HAZCOM          | hazardous communications  |
| LDR             | Land Disposal Restriction   |
| LPGAC           | Liquid Phase Granular Activated Carbon                                |
| µg/L            | micrograms per liter  |
| MIDLANT         | Mid-Atlantic Division   |
| MSDS            | Material Safety Data Sheet  |
| NaOH            | Sodium Hydroxide  |
| NAVFAC          | Naval Facilities Engineering Command                                  |
| NCDOH           | Nassau County Department of Health                                    |
| NPDES           | national pollutant discharge elimination system                       |
| NTR             | Navy Technical Representative   |
| NWIRP           | Naval Weapons Industrial Reserve Plant                                |
| NYSDEC          | New York State Department of Environmental Conservation               |
| NYSDOH          | New York State Department of Health                                   |
| OSHA            | Occupational Safety and Health Administration                         |
| OSR             | Offsite Rule  |
| PM              | Project Manager   |
| psi             | pounds per square inch  |
| PVC             | polyvinyl chloride  |
| QC              | Quality Control   |
| QCM             | Quality Control Manager   |
| RCRA            | Resource Conservation and Recovery Act                                |
| RQ              | reportable quantity   |

|       |  |
|-------|--|
| SSC   | Site Safety Coordinator                    |
| STC   | Senior Technical Consultant                |
| TCE   | trichloroethylene                          |
| TCLP  | toxicity characteristic leaching procedure |
| TOH   | Town of Hempstead                          |
| TtNUS | Tetra Tech NUS, Inc.                       |
| VOC   | volatile organic compound                  |

# 1.0 Introduction

---

AGVIQ-CH2M HILL Constructors, Inc. Joint Venture III (AGVIQ-CH2M HILL) has been contracted by the United States Navy, Naval Facilities Engineering Command (NAVFAC) Mid-Atlantic Division (MIDLANT) to prepare a work plan for construction activities to install interim emergency liquid-phase granular activated carbon (LPGAC) units at the Aqua New York, Inc. (AQUA-NY) Seamans Neck Road Water Plant, in Levittown, New York. This Work Plan was prepared under Response Action Contract No. N62470-08-D-1006, Task Order No. WE23.

## 1.1 Project Background

This project consists of construction and startup of a temporary and permanent well-head treatment remedy for AQUA-NY water supply wells N-8480 (Well No. 3) and N-9338 (Well No. 4) at the Seamans Neck Road Water Plant.

Trichloroethylene (TCE) has been detected at a maximum concentration of 2.1 micrograms per liter ( $\mu\text{g}/\text{L}$ ) in groundwater. The Navy is currently working with New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH), Nassau County Department of Health (NCDOH), and Town of Hempstead (TOH) to construct a long-term system to remove volatile organic compounds (VOCs) from Well Nos. 3S and 4S. These activities are authorized under the 2001 NYSDEC and 2003 Navy Record of Decision. A Basis of Design Report for the full-scale long-term system was prepared for this system in December 2010, and approval from the NCDOH was received in August 2011 (NCDH 3325-10). In September 2011, a design package was submitted for NCDOH review and comments were received in October and November 2011. NCDOH comments on the full-scale system design are currently being addressed, but submittal of the responses has been delayed to allow for design and submittals for the interim emergency treatment system to proceed. Construction of the full-scale long-term system is tentatively planned to start in spring 2012 and be completed in winter 2013. This Work Plan covers the temporary treatment system for well N-8480 (Well No. 3).

The interim emergency treatment system is being constructed to protect public health until the final well head treatment system is constructed and placed in operation. The Navy is conducting this action as a "time-critical removal action" under the Navy's Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authority.

To meet the needs of the Navy on this project to perform the upgrade of the groundwater treatment system requires the construction/installation of a temporary LPGAC groundwater treatment system that provides additional groundwater treatment prior to transmission to AQUA-NY customers. AGVIQ-CH2M HILL is proceeding as directed by the Navy on both the temporary treatment system and the full scale permanent LPGAC system. AGVIQ-CH2M HILL is currently soliciting bids for installation of the interim system to be completed by a New York Licensed General Contractor (GC). The GC and all lower tier subcontractors will be fully licensed in the State of New York for the construction and

overall installation of the system upgrades at the AQUA-NY Seamans Neck Road Water Plant.

## 1.2 Work Plan Organization

This Work Plan is organized to provide descriptions of the key elements of the project. It consists of the following sections:

- Section 1 – Introduction
- Section 2 – Objectives and Scope of Work
- Section 3 – Project Organization
- Section 4 – Description of Activities
- Section 5 – Accident Prevention and Quality Control (QC) Plans
- Section 6 – Environmental Protection Plan (EPP)
- Section 7 – Waste Management Plan
- Section 8 – References

Appendixes to the Work Plan consist of the following:

- Appendix A – Accident Prevention Plan (APP)
- Appendix B – QC Plan
- Appendix C – Tetra Tech NUS, Inc. (TtNUS) Interim LPGAC System Design Specifications
- Appendix D – Tetra Tech NUS, Inc. Interim LPGAC System Design Drawings



## 2.0 Objectives and Scope of Work

---

The Construction Work Plan provides a detailed description of activities that make up the construction sequence, and describes the means and methods of construction covering civil, mechanical, electrical, instrumentation and control, and QC during the construction process. The overall project schedule is presented in the preliminary construction schedule on Figure 2-1. The sequencing of construction activities may change if subcontractors determine there is a more efficient manner to perform construction activities. AGVIQ-CH2M HILL will notify the Navy's Contracting Officer (CO) or designated representative prior to the execution of specific construction activities if this occurs.

### 2.1 Objectives

The key objectives of the Implementation of Remedial Action Wellhead Treatment at Aqua New York Facility project are summarized below:

- Procure, install, and startup the Interim Emergency LPGAC Wellhead Treatment System per the TtNUS design documents (TtNUS, 2011a; Appendix C).
- Operate and maintain the temporary LPGAC system while the full scale system is being installed and brought online.
- Minimize the disturbance to plant operation and staff during construction.

### 2.2 Scope of Work

The scope of work is to implement both the temporary and full scale 100% Design Document (TtNUS, 2011a and 2011b). The 100% Design Document includes the design drawings, and specifications.

The definable features of work associated with the construction activities to implement the Interim Emergency LPGAC System design are as follows:

- Mobilization and Site Preparation
- Underground Piping and Utilities
- Concrete Work
- Process Equipment, Piping and Valves
- System Start-Up and Testing
- Demobilization
- System Operations and Maintenance
- Temporary LPGAC System Removal

**WE23 AQUA GAC System Construction  
NWIRP Beth Page, NY**

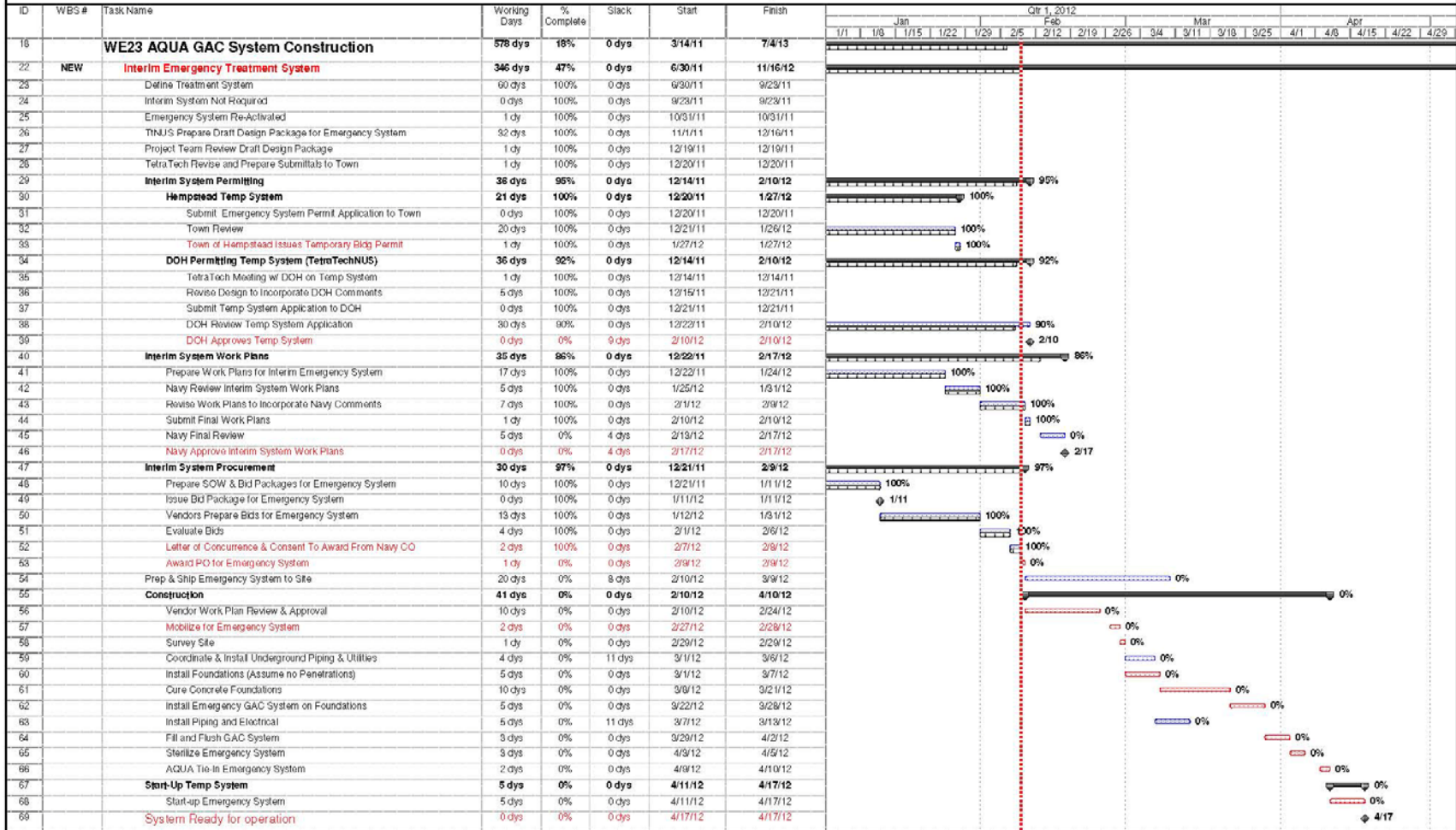


FIGURE 2-1  
Project Schedule

# 3.0 Project Organization

---

This section discusses the key roles and responsibilities of the project field team that will deliver this task order.

## 3.1 Project Team

- Project Manager – Jim Nicotri
- Senior Construction Manager – Steve Matney
- Senior Technical Consultant – Russell Ford
- Construction Manager (or Site Superintendent) - Randy Grogan
- Project QC Manager/Site Safety Coordinator (SSC) – Don Conger
- Field Engineer – Donald Conger
- GC Superintendant – TBD
- GC Health and Safety Manager - TBD

## 3.2 Roles and Responsibilities

### 3.2.1 Project Manager – Jim Nicotri

The Project Manager (PM) is responsible for the overall execution of the Task Order. He provides the managerial and administrative skills to ensure that resource allocation, planning, execution, and reporting meet contract and Task Order requirements. He is ultimately accountable for all work activities undertaken on this project. The PM may delegate some of these responsibilities to the Site Superintendent, Quality Control Manager, or others as appropriate who will remain onsite for the duration of project field activities.

### 3.2.2 Senior Construction Manager – Steve Matney

The Senior Construction Manager is responsible for identifying the appropriateness of the construction activities selected for the project, evaluates the current site conditions and construction methods used on the project. The Senior Construction Manager's duties include identifying appropriate short-term and long-term means and methods for constructing the project. The Senior Construction Manager will also review and guide the preparation of project technical work plans and project completion reports and supervise the field construction staff on the project.

### 3.2.3 Senior Technical Consultant – Russell Ford

The Senior Technical Consultant (STC) is responsible for reviewing the process information for the treatment system and site and for evaluating the performance of the system. The STC is also responsible for overseeing the construction of the project to ensure compliance with design drawings and specifications and will ultimately certify that the system was installed and operates in accordance with the design drawings and specifications.

### **3.2.4 Construction Manager/Site Superintendent – Randy Grogan**

The Site Superintendent will be responsible for all activities at the project site. The Site Superintendent is responsible to the PM for efficiently applying the resources of the field team to execute construction. In addition, the Site Superintendent is responsible for ensuring that the construction is conducted in accordance with the work plan and approved design, ensuring appropriate personnel are performing the required tasks, the construction methodology used is correct, and the quality, and safety of the project meet client and AGVIQ-CH2M HILL requirements. The Site Superintendent will assist the PM in ensuring that sufficient resources are allocated to maintain project schedule and budget and will provide daily feedback to the PM and others on project progress, issues requiring resolution, and other project-specific issues, as required.

### **3.2.5 Project QC Manager/ Site Safety Coordinator – Don Conger**

The Project QC Manager (QCM) / Site Safety Coordinator (SSC) is responsible for administering the provisions of the QC Plan and APP during the fieldwork. The QCM/SSC will ensure that proper Health and Safety precautions are considered and implemented during project implementation. In addition, the QCM/SSC will ensure the execution of the project's construction quality control system meets requirements. He/she also communicates the onsite QA/QC and Health and Safety program policies, objectives, and procedures to the project team and subcontractors. The onsite Field Engineer will assist the Project QCM in monitoring, controlling, and documenting the quality and safety of the onsite construction, activities. All documentation related to quality control for the project, including analytical test results, inspections, material test results, and audits, will be reviewed or prepared by the Project QC Manager or his delegate.

The Project QCM/SSC will also coordinate with and assist the Navy representatives in the performance of QA and safety audits and inspections.

# 4.0 Description of Activities

---

This section describes the construction activities to be performed for this project. The sequencing of construction activities are presented in Figure 2-1 and discussed in detail below. The sequencing of construction activities may change if subcontractors determine there is a more efficient manner to perform construction activities. AGVIQ-CH2M HILL will notify the Navy's CO or designated representative prior to the execution of specific construction activities if this occurs.

## 4.1 Interim Emergency LPGAC System

### 4.1.1 Pre-Mobilization Coordination

The activities described below will be addressed as part of the pre-mobilization coordination efforts.

#### Procurement

AGVIQ-CH2M HILL will source and procure the following services, materials, and equipment required to conduct the scope of work:

- General Contractor (Construction Services/System Installation)
- Analytical Laboratory
- Granulated Activated Carbon System Rental

#### Regulatory Interaction and Permitting

AGVIQ-CH2M HILL will coordinate regulatory interaction and permitting work with the Navy and regulatory agencies through the Navy.

Onsite remedial actions under CERCLA are exempt from obtaining permits and from compliance with administrative requirements of federal, state, and local environmental laws and regulations [CERCLA 121(e)]. However, onsite remedial actions must comply with substantive requirements of these regulations. Since this project will be constructed on AQUA NY property, a private commercial property, a certificate for construction permit is being pursued from the Nassau County Department of Health by the Navy and TtNUS, and a building permit is being pursued from the Town of Hempstead by the Navy and AGVIQ-CH2M HILL. Specialty trade permits for various components for the system installation/construction (i.e., electrical, fire protection systems, mechanical, and plumbing) will be obtained by each licensed subcontractor performing work at the site.

#### Submittals

AGVIQ-CH2M HILL will control and schedule submittals and will document the process in the Submittal Register. Submissions shall be made per the design specifications. Specifics on submittal review and control, as well as the submittal register can be found in the QC Plan (Appendix B).

## 4.1.2 Mobilization

As appropriate a pre-construction meeting will be held prior to mobilization with all of the necessary facility personnel, Construction Manager, Project QC Manager, Field Engineer, Subcontractor Superintendant, and other stakeholders to go over specific logistics and facility operations that the construction crew needs to be cognizant of during the construction process.

All necessary equipment and personnel will be mobilized to the site prior to commencement of construction activities. The initial mobilization, before the start of any construction activities, will include setting up the Construction Staging Area.

The staging area as well as the equipment and material storage area is located at the far Northwest corner of the facility (Figure 4-1). Materials will also be temporarily stored in this area. Equipment can be stored in this location when construction work is idle. Solid waste generated during construction, such as storm pipe and other materials, as well as a solid waste receptacle for disposal of trash generated by the field team will be temporarily stored in the area (Figure 4-1). Office trailers and restroom facilities will also be set up inside of this laydown area.

## 4.1.3 Site Preparation

Site preparation activities include utility locates and the initial setup of erosion and sediment controls for site grading.

Underground utilities will be located and marked using AQUA NY facility records, and a third party utility locator service.

Erosion and sediment control measures will be installed for the civil construction of the temporary equipment pad and the grading around the pad, as specified in the Erosion and Sediment Control Plan (ESCP) described in Section 6.0. Inspection of erosion and sediment control measures and corrective actions will occur as specified in Section 5.0. The primary erosion control mechanisms for this project are silt fences. Permanent vegetation and straw mulch will be used for stabilization/permanent erosion and sediment control.

## 4.1.4 Underground Piping and Utilities

Trenching to install underground piping will occur simultaneously with the installation of the concrete equipment pad, or while the pad is curing. Work will include excavation for 12-inch influent and effluent ductile iron pipe (DIP) as shown on Drawings M-1 and M-2. Hand excavation will be performed around the existing 12-inch Well 3 main taking precaution to avoid undermining the piping. Excavated material will be stored onsite per the ESCP in Section 5.0.

Since Well 3 is not currently being used, a shutdown will not be required to make the connection to the main. AQUA NY plant personnel will install the "T" and associated shut-off valve in the water main. AGVIQ-CH2M HILL will install remaining piping, fittings, valves, and associated appurtenances, as well as tie-in piping to the LPGAC system. The final tie-in to the existing Well 3 water main will be made by AQUA NY plant personnel.

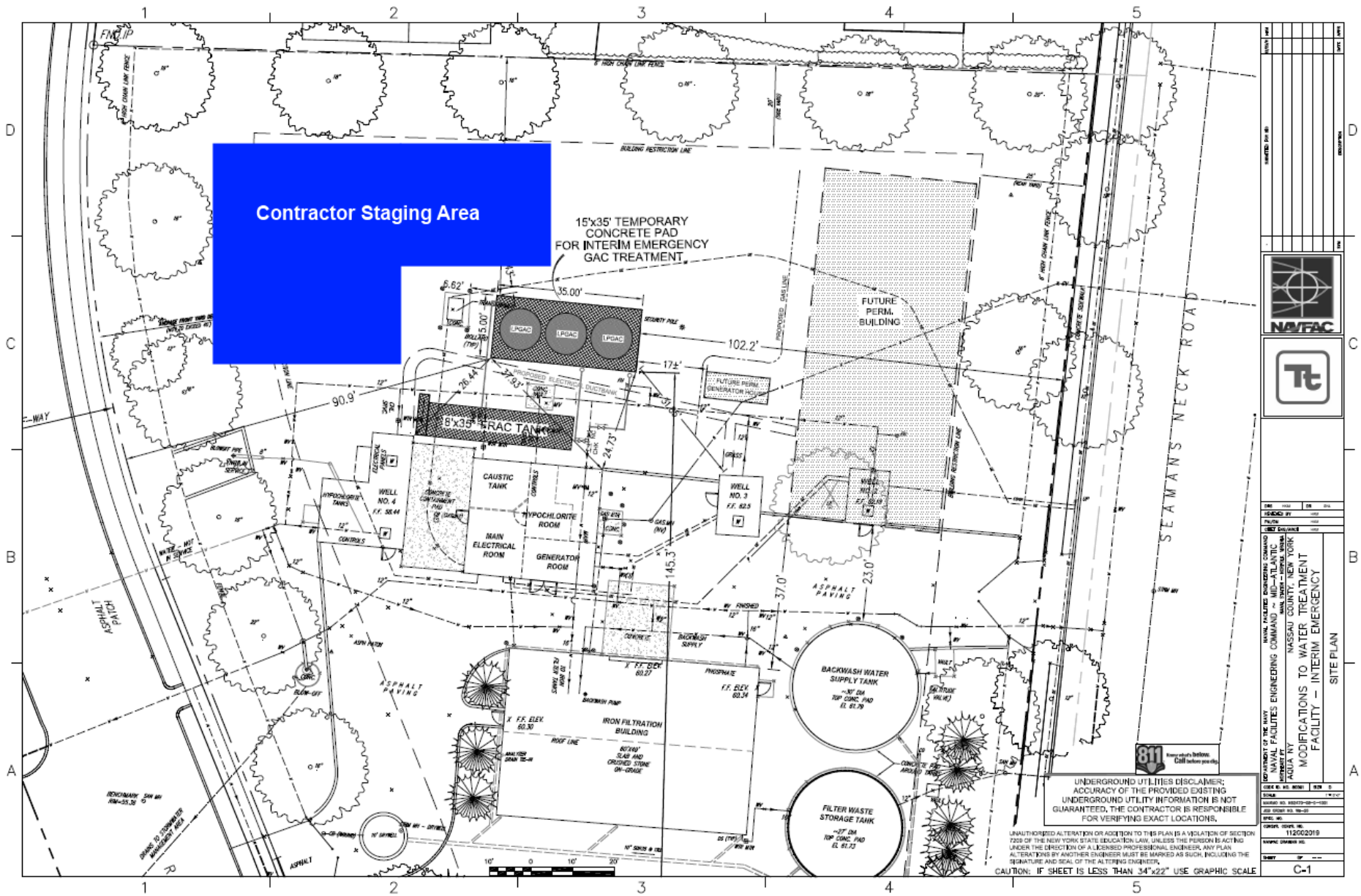


FIGURE 4-1  
 Contractor Staging Area

Once all underground work is complete, the trenches will be filled in using the excavated material, and properly compacted. The two stubs from the main will be left in place until the LPGAC units are installed and the new above ground piping can be connected to the LPGAC system manifolds. All underground piping work will be performed in accordance with specification Section 33 11 00 (Appendix C). Once installed, the lines will be disinfected per specifications.

#### **4.1.5 Concrete Work**

Minor grading (leveling of the equipment pad site), and fortifying of the subgrade will be made to the ground surface in preparation for installing the temporary LPGAC equipment pad, as well as the stable base for the Backwash Waste Holding Tank.

Installation of the foundation will begin once site preparation is completed. Activities will include, but not be limited to, the following:

- Install concrete pad (slab on grade) as shown in the design drawings. The concrete pad shall be constructed as described in the attached design specification Section 01 01 00 (Appendix C) and drawings (Appendix D) and as described below.
- Prepare a stable base and install the temporary Backwash Waste Holding Tank (frac tank, 20,000 gallons) for draining the LPGAC tanks.

Concrete pad work will be performed in accordance with the specifications, Sections 01 01 00 and 03 30 00, (Appendix C) and as indicated on the design Drawings M-2 and S-1 (Appendix D). Fill beneath both the concrete pad and the backwash waste holding tank shall be placed in lifts not to exceed 6 inches, and compacted to not less than 95 percent of maximum dry density (ASTM D 698).

Because of the time of year, a cold weather concrete mix is required. During the curing period, the slab will be protected, covered, and cured per the recommendations of the concrete supplier.

The concrete pad will be left to cure for at least 14 days prior to placing a load on the pad. The concrete must reach 80 percent of its 4,500-pound-per-square-inch (psi), 28-day compressive strength (to be determined by the break results) before equipment can be placed on the pad. The 14-day curing time may be shortened if the break results indicate that the concrete has reached its specified strength sooner.

#### **4.1.6 Process Equipment, Piping and Valves**

Upon curing of the concrete pad and completion of the underground piping installation, the temporary LPGAC vessels will be lifted onto the pad and associated piping assembled.

AGVIQ-CH2M HILL's subcontractor will receive and unload the LPGAC system. The three adsorber vessels will each be lifted (individually) onto the equipment pad per the subcontractor's lift plan. Each adsorber will be anchored into place as recommended by the LPGAC equipment supplier.

After the LPGAC system is set and secured into place, AGVIQ-CH2M HILL will assemble the piping, valves, monitoring equipment, and appurtenances as supplied by the LPGAC



Equipment Supplier. The equipment will be installed per the recommendations of the Equipment Supplier, and as designated in the design drawings (Drawings M-1 and M-2 in Appendix D). Variances with installation parameters will be adjusted and corrected as they are identified during construction. AGVIQ-CH2M HILL will also fabricate and install pipe supports as indicated on Drawing M-2 (Appendix D).

In addition, the Backwash Waste Holding Tank shall be delivered to the site, and the 8-inch PVC backwash waste piping shall be installed as shown on Drawings M-1, M-2, and C-2 (Appendix D).

#### 4.1.7 System Startup

Initial commissioning startup activities will commence upon completion of the installation of the LPGAC system, and related components, valving, piping, and monitoring equipment.

AGVIQ-CH2M HILL will conduct equipment testing, prove out, and startup testing in accordance with the design package. Since the finished (plant effluent) water will be used for distribution to the public, maintaining or sterilizing equipment in contact with the water is critical.

The activated carbon will be provided and installed by the LPGAC equipment vendor. However, AGVIQ-CH2M HILL will perform the initial disinfection/backwash/flushing of the carbon beds with assistance from the LPGAC equipment supplier, and as described in the specifications, Section 43 31 13. After backwashing, AGVIQ-CH2M HILL will sterilize the potable water piping as well as the LPGAC units per the LPGAC suppliers' recommendations, and as described in the design specifications, Sections 33 11 00, 40 05 13, and 43 31 13 (Appendix C).

The LPGAC comes in a 5 percent sodium hydroxide (NaOH) solution, and will be pumped into the adsorber through the effluent line. The NaOH solution will be drained through the adsorber effluent line into the Backwash Waste Holding Tank, where it will be neutralized using hydrochloric acid prior to being discharged to the sanitary sewer. The carbon will then be washed by adding contaminant-free (clean) water through the effluent line for 7 to 10 hours at a flow of 1.3-3 gpm/ft<sup>2</sup> (the equivalent of three bed volumes). This clean water shall come from the fire hydrant on the existing Aqua-NY water supply system. A pre-sterilized dedicated pressure hose will be used to convey the water to the GAC units, and a backflow prevention device shall be used to prevent flow back into the system. For subsequent backwashes that may be required, the LPGAC treated water from the two operating LPGAC units will be used to backwash the third unit. Because the pH of the well water is approximately 4.9, it will need to be increased to 5.5 to 9.5 using sodium hydroxide in the Backwash Waste Holding Tank before it is discharged into the existing sanitary sewer.

The process piping shall be disinfected by filling piping systems with a solution containing a minimum of 50 parts per million (ppm) of available chlorine, and allowed to stand for 24 hours. The system will be flushed with clean water from a hydrant on the Aqua-NY site. The chlorinated disinfection water and flush water will be discharged to the Backwash Waste Holding Tank and dechlorinated with Sodium thiosulfate prior to being discharged to the sanitary sewer.

All chemical additions will be performed safely without risk to worker or operator safety. All workers handling chemicals shall wear protective clothing, as identified in the APP, to prevent contact. The APP/SSHP addresses the use of these chemicals.

Field QC tests to be performed include pipe leakage tests and valve testing. AGVIQ-CH2M HILL will confirm that the LPGAC systems and ancillary equipment operate properly and function as intended.

Once the system has been sanitized and backwashed, AGVIQ-CH2M HILL will sample the carbon and water for VOCs, metal, and bacterial counts, and submit these samples to the testing laboratory. Once the system has passed all testing requirements, the LPGAC system will be ready for operation.

#### 4.1.8 Testing

During the latter part of the startup activities, and initial operations of the LPGAC unit and related equipment, groundwater will be processed. The processing of the groundwater will be documented by conducting influent and effluent sampling to show that the equipment meets the established treatment standards as outlined in the design drawings and specifications.

Samples will be collected in accordance with the Engineers Report (TtNUS, 2011c). The LPGAC units will be tested for bacteria, VOCs (TCE), arsenic, and iron. Samples of the LPGAC effluent (as well as one influent sample) will be collected at 0, 2, 5, 10, and 30 minutes. Sampling will then take place again 24 hours later. In order for the LPGAC system to pass testing, TCE and arsenic concentrations in the effluent must be present at limits less than 1 µg/L and 5 µg/L, respectively. In addition, bacteria concentration must be below laboratory detection.

Samples will be collected by AGVIQ-CH2M HILL and analyzed by an independent laboratory. All sampling and testing will be performed per the QC Plan (Appendix B).

#### 4.1.9 Demobilization

Seed, topsoil, compost, and water will be applied to the limits of disturbance requiring vegetation in accordance with the EPP (Section 6).

Following site restoration, the following demobilization activities will be conducted:

- Clean facilities, equipment, and materials as needed prior to final removal from the site, laydown area and equipment and materials storage area.
- Upon completion, remove any decontamination support features. Remove all temporary construction features, such as fencing, cones, barricades, flagging.
- Remove erosion and sediment control measures only after the site has been stabilized and accepted by the facility's CO or designated representative.
- Conduct a final inspection as specified in the QC Plan (Appendix B).

#### 4.1.10 System Operations and Maintenance

The temporary system will be operated and maintained by AGVIQ-CH2M HILL during the installation of the full scale LPGAC system. Because of the nature of the LPGAC system, few operational adjustments or maintenance will be required. Backwashing of the carbon beds may be required, and will be performed by AGVIQ-CH2M HILL only if the pressure drop across the system increases to 15 psi, per the Engineers Report (TtNUS, 2011c). AGVIQ-CH2M HILL will monitor the differential pressure indicator throughout the operation of temporary system.

Backwash Waste Water will be discharged to the Backwash Waste Holding Tank, and neutralized using hydrochloric acid prior to being discharged to the sanitary sewer. This process will be performed in accordance with the TtNUS Engineers Report (TtNUS, 2011c).

#### 4.1.11 Temporary LPGAC System Removal

Temporary LPGAC system removal will not take place until the temporary system is no longer needed. It is expected that Well #3 will be no longer be needed and shut down sometime between October and December 2012. AGVIQ-CH2M HILL will perform this work before demobilization from the full scale project. A description of this task will be provided in the full scale system Work Plan.

### 4.2 Closeout Documentation

At the conclusion of construction and related field activities, AGVIQ-CH2M HILL will prepare the Operations and Maintenance Plan and Construction Completion Report, which will summarize project activities associated with the installation of the temporary system.

#### 4.2.1 Operations and Maintenance Plan

This document will be generated and include the following:

- Description of the process and operational instruction
- Maintenance requirements
- Backwash instructions
- Carbon change-out instructions
- Health and Safety requirements for operation

#### 4.2.2 Construction Completion Report

This report will be generated and include the following:

- Description of activities completed
- Construction sequence and completion documentation
- Red-lined Record Drawings: Computer Aided Design (CAD) Record Drawings will be produced by TtNUS)
- Transportation and disposal records as required
- Daily production and QC reports

- Health and Safety summaries
- Analytical and prove-out results
- Operations and Maintenance Manual (under separate cover)
- Tables and figures depicting relevant data and photographic records

# 5.0 Accident Prevention and Quality Control Plans

---

AGVIQ-CH2M HILL strives to establish and maintain a safe, healthy, and accident-free workplace, and ensures that the workplace is maintained in accordance with regulations, guidelines, policies, and standards. AGVIQ-CH2M HILL has adopted responsible, proactive programs to provide appropriate protective measures where specific regulations relating to health and safety do not exist. AGVIQ-CH2M HILL will provide project oversight of field operations throughout the project to ensure the success and safety of the project, and to ensure that the required quality processes and procedures outlined in the APP (Appendix A) and the QC Plan (Appendix B) will be performed.

## 5.1 Accident Prevention Plan

The APP was prepared in response to the NAVFAC MIDLANT request to perform implementation of Remedial Action to install a Wellhead Treatment at the AQUA-NY facility. It is the intent of the APP to address requirements set forth by 29 Code of Federal Regulations (CFR) 1910, 29 CFR 1926 and EM 385 1-1, Appendix A. Site personnel, including AGVIQ-CH2M HILL and subcontractor personnel, who may be covered by the APP, must review the APP or be provided with a detailed briefing on the contents of the document and must sign the APP Acknowledgement Form. A hardcopy of the APP (Appendix A) will be available onsite for reference by site personnel.

## 5.2 Quality Control Plan

The purpose of the QC Plan is to provide the quality process and procedures that will be employed during the installation of treatment upgrades to the AQUA-NY facility water treatment system to ensure that the new system is installed and operates as designed. The QC Plan is provided in Appendix B.

# 6.0 Environmental Protection Plan

---

The EPP provides general procedures that will be implemented to prevent pollution and protect the environment during the construction activities at the AQUA-NY Seamans Neck Road Treatment Plant in Levittown, New York. The plan describes the measures that will be taken to comply with applicable federal, state, and local environmental requirements.

## 6.1 Specific Environmental Requirements

### 6.1.1 Erosion and Sediment Control Measures

Erosion and sediment control measures will be taken based on the minimum standards and specifications of the New York State Standards and Specifications for Erosion and Sediment Control (NYSDEC, 2005). A full ESCP will be submitted by AGVIQ-CH2M HILL for approval.

### 6.1.2 Stormwater Management

A General Permit for stormwater discharges from construction activities is not required for onsite removal actions under CERCLA 121(e). The project is not subject to the substantive requirements of the General Permit because the project disturbs less than 1 acre. Accordingly, a construction Stormwater Pollution Prevention Plan also is not required. However, erosion control practices will be implemented in accordance with erosion and sediment control measures indicated in the design documents, inspected at a minimum of once per week and after every storm of 0.5 inches or more, and any deficiencies corrected or resolved. When necessary, AGVIQ-CH2M HILL will be discharging to the AQUA-NY sewer connection, and therefore will be utilizing its national pollutant discharge elimination system (NPDES) permit. Discharge cannot exceed 200 gallons per minutes (gpm), and therefore will be coordinated with AQUA-NY.

### 6.1.3 Groundwater Pollution Prevention

Potential for groundwater pollution is not anticipated to be high for the construction activities associated with this project. All proper precautions and procedures will be followed per Section 6.3 Spill Prevention, Response, and Reporting Requirements and the design specifications (Appendix C).

### 6.1.4 Hazardous Material Management

AGVIQ-CH2M HILL will maintain an inventory of chemicals and hazardous materials brought onsite.

The SSC will request Material Safety Data Sheets (MSDSs) from the subcontractors and the vendors for chemicals delivered to the site by AGVIQ-CH2M HILL and its subcontractors.

The SSC will perform the following activities:

- Train employees on required site-specific hazard communication (HAZCOM).
- Confirm that the inventory of chemicals brought on site by subcontractors is available.
- Obtain an MSDS for each hazardous chemical before or as the chemical arrives onsite.
- Label chemical containers with the identity of the chemical and with hazard warnings, if applicable.

The volume of chemicals and hazardous materials used will be tracked and documented in the daily production or QC reports.

A hazardous material is defined as any material that, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may pose a substantial hazard to human health or the environment. The following is a list of hazardous materials or chemicals that may be brought onsite and incorporated as part of the final completion of the work, generated during the execution of the work for offsite disposal or recycling or otherwise used to facilitate site work, as defined in the APP (Appendix A). These hazardous materials or chemicals require spill prevention, spill control, and countermeasure processes to ensure sensitive environmental receptors are not adversely impacted in the event of a spill or release of these materials (see Section 6.3):

- Gasoline (small metal safety containers for fueling small engine equipment)
- Diesel fuel in heavy equipment or above ground storage tank
- Minor quantities of grease, motor oil and hydraulic oil for heavy equipment maintenance

The handling and storage of hazardous materials will be minimized to the extent possible to limit potential environmental and health impacts. Hazardous materials will be stored in the contractor staging area according to fire safety and environmental regulatory requirements. Incompatible materials will be segregated, and flammable materials will be kept in flammable materials storage lockers when not in use.

Personnel will be responsible for ensuring that these hazardous materials are properly maintained and not spilled. If a spill should occur, the spill procedures in the APP (Appendix A) must be adhered to, including notification requirements.

## 6.2 Natural Resources Protection

### 6.2.1 Protection of Fish and Wildlife

Construction operations will be managed in such a manner as to minimize interference with fish and/or wildlife habitat. Care will be taken to ensure that temporary erosion and sediment controls are installed to prevent stormwater runoff or discharge.

### 6.2.2 Protection of Land Resources

The extent of clearing operations to complete the grading and building construction will be limited to stripping the vegetation and topsoil in the area to be graded and where the LPGAC equipment will be installed. No tree removal or clearing and grubbing are expected

to be required to complete these activities. The amount of land disturbed will be minimized, the amount of time bare soil is exposed will also been minimized, and the disturbed land will be stabilized.

### **6.2.3 Protection of Water Resources**

No fuel oils, construction wastes, or otherwise harmful materials will be permitted to enter the water resources. The erosion and sediment controls (silt fence or commercial silt dikes) will be installed to protect water resources.

### **6.2.4 Protection of Air Resources**

Surface and air movement of dust will be limited during land-disturbing and construction activities (i.e., excavation and grading). The areas will not be monitored with a dust meter, but site conditions will be observed by the site superintendent or his delegate who will take action to suppress dust. Dust control will be performed as the work proceeds and whenever a dust nuisance or hazard occurs.

### **6.2.5 Protection of Historical and Archaeological Resources**

No archaeological features or artifacts are known to be present at the construction site. Therefore, it is assumed that no historical or archaeological resources will be affected by the implementation of the construction activities. If AGVIQ-CH2M HILL suspects discovery of any item or area of historic or archaeological interest during construction activities, the area will be left undisturbed and findings will be immediately reported to the Navy.

## **6.3 Spill Prevention, Response, and Reporting Requirements**

The following provisions for spill prevention and response establish minimum site requirements. All spills will be reported by AGVIQ-CH2M HILL as indicated in the APP (Appendix A). Refer to the APP for emergency response procedures and further reporting requirements.

In the event of a release of any potentially hazardous waste, chemical, or material, AGVIQ-CH2M HILL will immediately report any release to the Navy. The definition of release includes any “spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment (including the abandonment or discarding of barrels, containers, and other closed containers)” of any potentially hazardous chemical, substance, and/or material.

It is important that the Program Environmental Manager (EM) also be immediately notified of spills/releases and other environmental compliance-related incidents (e.g., permit exceedance, notice of violation, regulatory violation) or near-loss environmental incidents. The Program EM will evaluate the spill or release to determine agency (e.g., National Response Center or state) reporting requirements. Immediate internal spill reporting is critical to ensure compliance with agency spill reporting requirements (U.S. Environmental Protection Agency [EPA] requires reporting certain spills/releases within 15 minutes).



### 6.3.1 Spill Prevention

Fuel, chemical, and waste storage areas will be properly protected from onsite and offsite vehicle traffic. If fuel is stored onsite, fuel tanks or containers (including fuel storage and waste storage) will be equipped with secondary containment. These tanks or containers will be inspected weekly for signs of leaks. Accumulated water must be inspected for signs of contamination (e.g., product sheen, discoloration, and odor) before being discarded. Fire protection provisions outlined in the APP (Appendix A) will be adhered to.

Chemical products will be properly stored, transferred, and used. Adequate spill control materials will be maintained at the local work area if chemical product use occurs outside areas equipped with spill control materials.

### 6.3.2 Spill Containment and Control

The specific spill containment and control processes are identified in the APP (Appendix A). However, in general, spill containment and control materials will be maintained in the support zone, at fuel storage and dispensing locations, and at waste storage areas. Incidental spills will be contained with sorbent and disposed of properly. Spilled materials must be immediately contained and controlled. Spill response procedures include:

- Immediately warn any nearby workers and notify individual responsible for site operations.
- Assess the spill area to ensure that it is safe to respond.
- Evacuate area if spill presents an emergency.
- Ensure all unnecessary persons are removed from the hazard area.
- Put on protective clothing and equipment.
- If a flammable material is involved, remove all ignition sources, and use only spark- and explosion-proof equipment for recovery of material.
- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.
- Stop source of spill.
- Establish site control for spill area.
- If wastes reach a storm sewer, dam the outfall by using sand, earth, sandbags, etc. Pump this material out into a temporary holding tank or drums as soon as possible.
- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.
- Spray the spill area with foam, if available, if volatile emissions may occur.
- Apply appropriate spill control media (e.g., clay, sand, lime) to absorb discharged liquids.

- For large spills, establish diking around leading edge of spill using booms, sand, clay, or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank. Follow proper ground and bonding procedures of equipment during recovery efforts. Intrinsically safe equipment must be used in recovery operations.

### **6.3.3 Spill Cleanup and Removal**

All spilled material, contaminated sorbent, and contaminated media will be cleaned up and removed as soon as possible. Contaminated spill material will be drummed, labeled, and properly stored until material is disposed. Contaminated spill material will be managed as waste (see Section 7.0 Waste Management Plan) and disposed of according to applicable, federal, state, and local requirements. Following spill cleanup, the cause of the spill will be investigated and material storage and handling procedures will be reviewed and revised where appropriate.

# 7.0 Waste Management Plan

---

This plan addresses the management and disposal requirements for wastes generated during construction activities. It is not anticipated that hazardous waste will be generated during these construction activities. The following procedure and practices, however, are consistent with the requirements for managing waste under the hazardous waste generator rules and implemented as “best management practices” and as a contingency in the event that hazardous wastes are generated.

The following wastes may be generated during these activities:

- Concrete debris
- PVC piping
- GAC system backwash waste water
- Process piping chlorinated disinfection water and flush water
- Spent GAC (GAC change out is not anticipated, but provisions for managing spent GAC are included as contingency).

Excavated soil will be returned to the excavation/trench after pipeline work is complete.

Backwash Waste Water shall be discharged to the Backwash Waste Holding Tank, and neutralized using hydrochloric acid prior to being discharged to the sanitary sewer. This shall be performed in accordance with the Engineers Report (TtNUS, 2011c).

Process piping chlorinated disinfection water and flush water shall be discharged to the Backwash Waste Holding Tank, and dechlorinated prior to being discharged to the sanitary sewer.

## 7.1 Exemptions and Exclusions

Spent GAC is considered a sludge under the Resource Conservation and Recovery Act (RCRA, 40 CFR 261.10), i.e., “any solid, semi-solid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility exclusive of the treated effluent from a wastewater treatment plant.” Because the spent carbon is classified as a sludge, it is exempt from classification as a solid waste when it is reclaimed, pursuant to 40 CFR 261.2(c)(3). Wastes that are exempt from classification as a solid waste, are also exempt as a hazardous waste (i.e., exempt from hazardous waste regulations).

Use of this exemption eliminates the need for future toxicity characteristic leaching procedure (TCLP) testing of the GAC prior to reclamation. However, the regeneration facility may require testing prior to shipment. Also, testing for total VOCs may still be required to determine if the spent carbon is regulated as a hazardous material during transportation, as discussed further later.

It is assumed that spent GAC will be returned to the vendor for reclamation and that the TCE contained in the spent GAC is not a listed hazardous waste. Any spent GAC that will not be reclaimed will be characterized and managed as a waste.

## 7.2 Waste Characterization

Construction and Demolition (C&D) debris and miscellaneous solid wastes (including concrete and PVC piping) will be characterized as nonhazardous using process knowledge. C&D debris will be recycled and reused as much as practically possible. The remainder of the C&D debris will be disposed of as nonhazardous waste. AGVIQ-CH2M HILL shall comply with the solid waste management regulations (40 CFR 258) and hazardous waste regulations (40 CFR 260-262).

### 7.2.1 Waste Profile

Waste characterization information for wastes will be documented on a waste profile form provided by the designated offsite disposal, or recycling facility as part of the waste acceptance process. The profile will be reviewed, approved, and signed by the Navy's CO or designated representative. Signed profile(s) will then be submitted to the offsite facility for acceptance.

The profile typically requires the following information including but not limited to:

- Generator information including name, address, contact, and phone number
- Site name including street/ mailing address
- Process generating waste
- Source of contamination
- Historical use for area
- Waste composition (e.g., 100 percent debris)
- Physical state of waste (e.g., solid)
- Hazardous waste codes (if applicable)

A copy of the approved waste profile or letter of approval will be received prior to scheduling offsite transportation of the waste.

## 7.3 General Waste Management Requirements

Wastes will be accumulated in an area identified or approved by AGVIQ-CH2M HILL or designated representative. All containers will be inspected on arrival at the site for signs of disrepair or contamination, and to verify that the containers are empty. If container does not arrive in good condition, is contaminated, or is not empty, it will be immediately rejected and documented.

Good housekeeping practices will be maintained at all waste accumulation areas.

### 7.3.1 Containment

Construction and demolition, and general debris will be either placed in storage piles, drums, or in roll-off boxes. The storage of process water may be recirculated onsite or disposed offsite.

#### Tanks

- Tanks will be inspected upon arrival onsite for signs of deterioration and contamination. Any tank arriving onsite with contents or in poor condition will be rejected.
- Tanks will be provided with covers and secondary containment.
- Each tank will be labeled as discussed above.
- Tanks will not be located near a stormwater inlet or conveyance.

#### Storage Piles

Storage piles, if used, will be managed in a manner that maintains good housekeeping, prevents the spread of contamination, and minimizes the potential for wildlife entrapment.

Management activities will include the following:

- Liners and covers will be minimum 6-mil reinforced plastic sheeting
- Liners will be selected based on the characteristics of the materials to be stored
- Storage piles will be covered as necessary to prevent storm water run-on and runoff
- Storage piles located in buildings do not require liners or covers
- Contaminated materials will be accumulated in lined storage piles

#### Drums/Small Containers

The following guidelines relate to drums and small containers:

- Drums will be inspected and inventoried upon arrival onsite for signs of contamination and/or deterioration
- Adequate aisle space (e.g., 30 inches) will be provided for containers such as 55-gallon drums to allow the unobstructed movement of personnel and equipment. A row of drums should be no more than two drums wide
- Each drum will be provided with its own label, and labels will be visible
- Drums will remain closed except when removing or adding waste to the drum. Covers will be properly secured at the end of each workday. Closed means that the lid and/or bung must be on and securely tightened (except with adding or removing waste)
- Drums will be disposed of with the contents. If the contents are removed from the drums for offsite transportation and treatment or disposal, the drums will be decontaminated prior to re-use or before leaving the site
- Drums containing liquids or hazardous waste will be provided with secondary containment and may not be located near a stormwater inlet or conveyance.

## Roll-off Boxes

- Roll-off boxes will be inspected upon arrival onsite. Any roll-off containers arriving with contents or deterioration will be rejected
- Roll-off boxes for contaminated soil will be provided with covers and disposable liners. Liners will be disposed of as contaminated debris
- When not in use and at the end of each workday, covers will be properly secured
- Old labels will be removed and each box will be provided with its own label, and labels will be visible
- Roll-off containers will be inspected by the transporter after removal of the liner and decontaminated in the event of evidence of liner failure
- Roll-off containers will be monitored to ensure that they will meet U.S. Department of Transportation (DOT) over the road weight restrictions.
- Roll-off boxes may not be located near a stormwater inlet or conveyance

### 7.3.2 Waste Storage Time Limit

Hazardous wastes (if generated) will be removed from the site within 90 days from date of generation, as required under 40 CFR 262.34(a) for large quantity generators. Other wastes will be removed from the site as soon as possible. The date of generation is the day that a waste is first placed in a container (drum or roll-off box) or stockpile.

### 7.3.3 Labels

Waste containers will be labeled in accordance with 49 CFR 172, 173, and 178. Labels will include the type of waste, location from which the waste was generated, and accumulation start date. Containers, roll-off boxes, and tanks used to store/accumulate waste will include one of the following labels:

- “Analysis Pending” - Temporary or handwritten label until analytical results are received and reviewed. This label will include the accumulation start date
- “Hazardous Waste” - Pre-printed hazardous waste labels with the following information:
  - Accumulation start date
  - Generator Name
  - EPA ID number
  - Waste codes
  - Prior to transport, the manifest number must be added (for containers of less than 110-gallon capacity)
- “Non-Hazardous Waste” - Preprinted labels with the following information:
  - Accumulation start date
  - Generator name:
  - EPA ID number
  - Waste-specific information (e.g., contaminated soil)

Where applicable, the major hazards (e.g., flammable, oxidizer, and carcinogen) also will be included on the label.

### 7.3.4 Inspections

Waste accumulation and equipment storage areas will be inspected at least weekly for malfunctions, deterioration, discharges, and leaks that could result in a release.

- Containers, tanks and roll-off containers will be inspected for leaks, signs of corrosion, or signs of general deterioration.
- Stockpiles will be inspected for liner and berm integrity.
- All areas will be inspected to ensure that good housekeeping practices are maintained.

Any deficiencies observed or noted during inspection will be corrected immediately, and corrective measures documented. Appropriate measures may include transfer of waste from leaking container to new container, replacement of liner or cover, or repair of containment berm. Copies of inspection reports and corrective measures will be maintained onsite, and available for review.

## 7.4 Security/Emergency Response

A barrier, such as barricade tape or temporary fencing, will be provided for hazardous waste accumulation areas, and for other waste storage areas that are accessible to the general public. Hazardous waste storage areas will also have signs that provide 24-hour emergency contacts and telephone numbers.

Waste accumulation areas will contain emergency response equipment appropriate to the wastes' hazards. The APP (Appendix A) identifies the project emergency response procedures and equipment, including emergency response contacts and phone numbers.

In addition to the APP procedures, hazardous waste accumulation areas will be provided with fire extinguishers (for wastes known or suspected to be flammable or ignitable), decontamination equipment, and an alarm system (if radio equipment is not available to all staff working in accumulation area). Spill control equipment (e.g., sorbent pads) will be available in the waste accumulation areas, and where liquids are transferred from one vessel to another.

## 7.5 Employee Training

Field staff that will manage hazardous or potentially hazardous waste will comply with 40 CFR 265.16 through:

- Occupational Safety and Health Administration (OSHA) 1910.120 HAZWOPER training
- On-the-job training which includes:
  - Site-specific APP review - requires each site worker, and guests to review and sign the plan
  - Activity hazard analysis and daily "tailgate" meetings
  - Project-specific work plan review; e.g., this Waste Management Plan

## 7.6 Waste Transportation

### 7.6.1 Shipping Documentation

Prior to offsite disposal of any waste, a waste approval package for each waste stream will be prepared. This package will include a waste profile naming the Navy as the generator of the waste, analytical summary table(s) applicable to the waste, land disposal restriction (LDR) notification for any hazardous wastes, a completed waste manifest, and any other applicable information necessary for the Navy to complete its review of the disposal package and signature as the generator. The profile will be reviewed, approved, and signed by the Navy's CO or designated representative. The signed profile will then be submitted to the offsite facility for acceptance and approval. Once the approval letter is received from the offsite facility, transportation can be scheduled.

Each load of waste material will be manifested prior to leaving the site. At a minimum, the manifest form will include the following information:

- Generator information including name, address, contact, and phone number, EPA ID number
- Transporter information including name, address, contact and phone number, EPA ID number
- Designated facility information including name, address, phone number, EPA ID number
- Site name including street/ mailing address
- DOT Proper Shipping Name (e.g., Hazardous Waste Solid, n.o.s., 9, UN 3077, PG III [D008])
- Type and number of container
- Quantity of waste (volumetric estimate)
- Task order or job number
- Profile number
- 24-hour emergency phone number

Additionally, each shipment of waste will also have a weight ticket.

The generator and the transporter must sign the manifest prior to the load of waste leaving the site. Hazardous and non-hazardous waste manifests will be signed by the Navy's CO or designated representative. The original signed manifest will be returned to the address of the generator.

## 7.7 Department of Transportation Requirements

Requirements under 49 CFR 171 will apply to all offsite shipments of hazardous materials. The information contained in this section is provided as a general guide. Requirements



specific to each hazardous material will be determined in the field. It is the responsibility of a DOT-trained individual to ensure that the requirements of 49 CFR 171 are met.

### 7.7.1 Shipping Name

Material that exhibits one of the nine DOT hazard class characteristics (e.g., explosive, flammable, poison, combustible) is regulated under DOT rules for the transportation of hazardous material. If material is suspected to be hazardous, it will be shipped under the suspected hazard class.

Each shipment of a suspected hazardous material will be properly classified using the Hazardous Materials Table in 49 CFR 172.101. All determinations will be made by DOT-trained personnel.

### 7.7.2 Packaging, Marking, and Labeling

The shipping name, hazard class, identification number, technical names (if applicable), EPA markings and waste code numbers, and consignee/consignor designations will be marked on packages for shipment (49 CFR 172.301). Once a waste is characterized, reference will be made to the Hazardous Materials Table in 49 CFR 172.101 to determine the appropriate label.

### 7.7.3 Placards

Appropriate placards will be determined by DOT-trained personnel. Specific placard descriptions are found starting at 49 CFR 172.521. If a placard is required, it will be affixed on each side and each end of the vehicle.

### 7.7.4 Shipping Spent GAC

In general, spent GAC is not considered a DOT-regulated hazardous material. The MSDS for spent GAC will be consulted to make the determination prior to shipping this material. Spent GAC, however, may still be a DOT-regulated hazardous material because of the type and quantity of contaminants adsorbed by the carbon. A Class 9 hazardous material is defined in 49 CFR 173.140 to include materials meeting the definition of a hazardous substance.

A hazardous substance is a material listed on the CERCLA hazardous substances list, in a quantity in one package, which equals or exceeds the CERCLA reportable quantity (RQ). If the material is present in a mixture or solution, the concentration must equal or exceed the threshold concentration specified for that material's RQ value. TCE is on the CERCLA hazardous substances list, with an RQ of 100 pounds. The concentration threshold specified for an RQ of 100 pounds in 49 CFR 171.8 is 2,000 ppm. Therefore, in order for the spent carbon containing TCE to be considered a hazardous substance for purposes of transportation it must meet all of the following criteria:

- The total (not TCLP) TCE concentration in the carbon must equal or exceed 2,000 ppm.
- A single package of carbon, as it is transported from the facility, must contain at least 100 pounds of pure TCE. If the carbon is packaged in 55-gallon drums, a single package

is one 55-gallon drum. If the carbon is transported in bulk, a single package is the bulk transport vehicle.

If the carbon meets these criteria it will be a DOT-regulated hazardous material in Class 9. The DOT shipping description that should appear on the hazardous waste manifest will be: "RQ, Environmentally Hazardous Substances Solid N.O.S., 9, UN 3077, PG III (TCE)."

## 7.8 Transporter Requirements

Each transportation vehicle and load of waste will be inspected before leaving the site and documented. The quantities of waste leaving the site will be recorded on a transportation and disposal log. A contractor licensed for commercial transportation will transport non-hazardous wastes. In the event that wastes are hazardous, the transporter will have a EPA Identification number, and will comply with transportation requirements outlined in 49 CFR 171-179 (DOT) and 40 CFR 263.11 and 263.31 (Hazardous Waste Transportation).

The transporter will be responsible for weighing loads at a certified scale. For each load of material, weight measurements will be obtained for each full and empty container, dump truck, or tanker truck. Disposal quantities will be based on the difference of weight measurements between the full and empty container or dump truck. Weights will be recorded on the waste manifest.

The transporter will observe the following practices when hauling and transporting wastes offsite:

- Minimize impacts to general public traffic.
- Repair road damage caused by construction and/or hauling traffic.
- Line and cover trucks/trailers used for hauling hazardous or regulated waste to prevent spills or releases.
- Decontaminate vehicles prior to re-use, other than hauling contaminated waste.
- Seal trucks transporting liquids.

Wastes or materials from other projects may not be combined with wastes generated during this project.

All personnel involved in offsite disposal activities will follow safety and spill response procedures outlined in the APP.

## 7.9 Disposal of Waste Streams

Consistent with the Offsite Rule (OSR), wastes generated from remediation activities at a CERCLA site may only be transferred to offsite facilities that determined acceptable by the EPA Regional Offsite Contact (40 CFR 300.400(b)). AGVIQ-CH2M HILL will maintain a record of the facility's OSR approval prior to use. It is assumed that OSR applies to any waste or media that contains a contaminant, but does not apply to uncontaminated or decontaminated construction debris (i.e., inert construction materials).

## 7.9.1 Recordkeeping

The following records and documents will be maintained for material disposed off-site:

- Transportation and offsite disposal records, including:
  - Profiles and associated characterization data
  - Manifests, LDR notifications/certifications, bills of lading, and weight tickets
  - Offsite facility waste receipts, certificates of disposal/destruction
- Training records
- Inspection records
- AGVIQ-CH2M HILL will complete and submit a Waste Generation Report form as provided by the Navy, quarterly (at a minimum).

## 8.0 References

---

New York State Department of Environmental Conservation (NYSDEC). 2005. New York State Standards and Specifications for Erosion and Sediment Control.

Tetra Tech NUS, Inc. (TtNUS). 2011a. Modifications to AQUA New York, Inc. Water Treatment Facility Interim Emergency Seamans Neck Road Nassau County, New York 100% Design Documents. December.

Tetra Tech NUS, Inc. (TtNUS). 2011b. Modifications to AQUA New York, Inc. Water Treatment Facility Seamans Neck Road Nassau County, New York 100% Design Documents. September.

Tetra Tech NUS, Inc. (TtNUS). 2011c. Engineers Report for Interim Emergency Treatment for Wellhead Treatment for Trichloroethene Contamination, Aqua New York's Seamans Neck Road Water Plant, Naval Weapons Industrial Reserve Plant, Bethpage, New York. December 21.

APPENDIX A

# Accident Prevention Plan

---

APPENDIX B

# Quality Control Plan

---

# Final Quality Control Plan

## Installation of Interim Emergency Treatment Liquid-Phase Granular Activated Carbon Units

Aqua New York, Inc.  
Seamans Neck Road Water Plant  
NWIRP Bethpage, New York

Revision No. 01

Contract No. N62470-08-D-1006  
Task Order No. WE23

Submitted to:



Department of the Navy  
Naval Facilities Engineering Command  
Mid-Atlantic

Prepared by:



February 2012

Final Quality Control Plan

Installation of Interim Emergency Treatment  
Liquid-Phase Granular Activated Carbon Units

Aqua New York, Inc. Seamans Neck Road Water Plant  
NWIRP Bethpage, New York

Revision No. 01

Contract No. N62470-08-D-1006  
Task Order No. WE23

Submitted to:  
Department of the Navy  
Naval Facilities Engineering Command  
Engineering Field Activity, Mid-Atlantic

Prepared by:



1000 Abernathy Road  
Suite 1600  
Atlanta, GA 30328

February 2012

Prepared/Approved By:

\_\_\_\_\_  
Jim Nicotri, Project Manager

February 8, 2012

\_\_\_\_\_  
Date

Approved By:

\_\_\_\_\_  
Michael Halil, Deputy Program Manager

February 9, 2012

\_\_\_\_\_  
Date

Client Acceptance:

\_\_\_\_\_  
U.S. Navy Responsible Authority

\_\_\_\_\_  
Date



# Contents

---

|   |            |
|---|------------|
| <b>Acronyms and Abbreviations.....</b>                              | <b>vii</b> |
| <b>1.0 Introduction.....</b>  | <b>1-1</b> |
| 1.1 Scope of Work.....  | 1-1        |
| 1.2 Project Background.....   | 1-1        |
| 1.3 Project Objectives.....   | 1-2        |
| <b>2.0 Organization and Responsibilities.....</b>                   | <b>2-1</b> |
| 2.1 Quality Management Roles and Responsibilities.....              | 2-1        |
| 2.1.1 Program Quality Manager - Theresa Rojas.....                  | 2-1        |
| 2.1.2 Program Health and Safety Manager - Joshua Painter.....       | 2-1        |
| 2.1.3 Project Manager - Jim Nicotri.....                            | 2-1        |
| 2.1.4 Site Superintendent/Construction Manager - Randy Grogan.....  | 2-2        |
| 2.1.5 Project QC Manager /Site Safety Coordinator - Don Conger..... | 2-3        |
| 2.1.6 Senior Construction Manager - Steve Matney.....               | 2-3        |
| 2.1.7 Senior Technical Consultant - Russell Ford.....               | 2-4        |
| 2.2 Outside Organizations and Subcontractors.....                   | 2-4        |
| <b>3.0 Construction Quality Control.....</b>                        | <b>3-1</b> |
| 3.1 Procedures for Performing the Three Phases of Control.....      | 3-1        |
| 3.1.1 Preparatory Phase.....  | 3-1        |
| 3.1.2 Initial Phase.....  | 3-2        |
| 3.1.3 Follow-up Phase.....  | 3-3        |
| 3.2 Mobilization and Site Preparation.....                          | 3-3        |
| 3.2.1 Preparatory Phase.....  | 3-4        |
| 3.2.2 Initial Phase.....  | 3-4        |
| 3.2.3 Follow-up Phase.....  | 3-4        |
| 3.3 Underground Piping and Utilities.....                           | 3-5        |
| 3.3.1 Preparatory Phase.....  | 3-5        |
| 3.3.2 Initial Phase.....  | 3-6        |
| 3.3.3 Follow-up Phase.....  | 3-6        |
| 3.4 Concrete Work.....  | 3-7        |
| 3.4.1 Preparatory Phase.....  | 3-7        |
| 3.4.2 Initial Phase.....  | 3-7        |
| 3.4.3 Follow-up Phase.....  | 3-8        |
| 3.5 Process Equipment, Piping and Valves.....                       | 3-8        |
| 3.5.1 Preparatory Phase.....  | 3-9        |
| 3.5.2 Initial Phase.....  | 3-9        |
| 3.5.3 Follow-up Phase.....  | 3-9        |
| 3.6 System Startup and Testing.....                                 | 3-9        |
| 3.6.1 Preparatory Phase.....  | 3-10       |
| 3.6.2 Initial Phase.....  | 3-11       |
| 3.6.3 Follow-up Phase.....  | 3-11       |
| 3.7 Demobilization.....   | 3-12       |

|             |  |             |
|-------------|--|-------------|
| 3.7.1       | Preparatory Phase.....   | 3-12        |
| 3.7.2       | Initial Phase.....   | 3-12        |
| 3.7.3       | Follow-up Phase.....   | 3-12        |
| 3.8         | System Operation and Maintenance .....                               | 3-13        |
| 3.8.1       | Preparatory Phase.....   | 3-13        |
| 3.8.2       | Initial Phase.....   | 3-13        |
| 3.8.3       | Follow-up Phase.....   | 3-13        |
| 3.9         | Temporary LPGAC System Removal .....                                 | 3-14        |
| 3.10        | Pre-Final Inspection.....  | 3-15        |
| 3.11        | Final Acceptance Inspection.....                                     | 3-15        |
| <b>4.0</b>  | <b>Testing Requirements.....</b>                                     | <b>4-1</b>  |
| 4.1         | Certification of Chemical Laboratories .....                         | 4-1         |
| 4.2         | Certification of Concrete Laboratories .....                         | 4-1         |
| 4.3         | Test Plan and Log.....   | 4-1         |
| <b>5.0</b>  | <b>Project Meetings .....</b>  | <b>5-1</b>  |
| 5.1         | Pre-construction Meeting.....  | 5-1         |
| 5.2         | Coordination and Mutual Understanding Meeting.....                   | 5-1         |
| 5.3         | QC Meeting.....  | 5-2         |
| <b>6.0</b>  | <b>Reporting, Field Records, and Construction Documentation.....</b> | <b>6-1</b>  |
| <b>7.0</b>  | <b>QC Documentation.....</b>   | <b>7-1</b>  |
| 7.1         | Contractor Production Report.....                                    | 7-1         |
| 7.2         | Contractor Quality Control Report .....                              | 7-2         |
| 7.3         | Project Files .....  | 7-3         |
| 7.4         | Field Documentation Operating Procedures .....                       | 7-3         |
| 7.5         | Field Logbook.....   | 7-3         |
| <b>8.0</b>  | <b>Construction QC Submittals .....</b>                              | <b>8-1</b>  |
| 8.1         | Submittal Review and Control.....                                    | 8-1         |
| <b>9.0</b>  | <b>Change Control .....</b>  | <b>9-1</b>  |
| 9.1         | Construction Changes .....   | 9-1         |
| <b>10.0</b> | <b>Noncompliance and Corrective Actions.....</b>                     | <b>10-1</b> |
| 10.1        | Corrective Measure Plan.....   | 10-1        |

## Tables

|     |  |
|-----|--|
| 2-1 | Roles, Responsibilities, and Authorities of Key Project Personnel        |
| 3-1 | QC Procedures for Mobilization and Site Preparation                      |
| 3-2 | QC Procedures for Underground Piping and Utilities                       |
| 3-3 | QC Procedures for Civil Construction (concrete pad and base preparation) |
| 3-4 | QC Procedures for Installation of Process Equipment                      |
| 3-5 | QC Procedures for LPGAC Unit Installation and Start-Up                   |
| 3-6 | QC Procedures for Demobilization   |
| 3-7 | QC Procedures for O&M  |
| 4-1 | Testing Requirements   |

6-1 Reporting and Field Documentation Required

**Figure**

2-1 Organization Chart

**Attachments**

A Project QC Forms

# Acronyms and Abbreviations

---

|                 |   |
|-----------------|---|
| AGVIQ-CH2M HILL | AGVIQ-CH2M HILL Constructors, Inc. Joint Venture III                  |
| AHA             | activity hazard analysis  |
| APP             | Accident Prevention Plan  |
| AQUA-NY         | Aqua New York, Inc.   |
| CERCLA          | Comprehensive Environmental Response, Compensation, and Liability Act |
| CO              | Contracting Officer   |
| CPR             | Contractor Production Report  |
| CQCR            | Contractor QC Report  |
| DFOW            | Definable Feature of Work   |
| H&S             | health and Safety   |
| LPGAC           | Liquid-Phase Granular Activated Carbon                                |
| µg/L            | micrograms per liter  |
| NCDOH           | Nassau County Department of Health                                    |
| NFESC           | Naval Facilities Engineering Service Center                           |
| NYSDEC          | New York State Department of Environmental Conservation               |
| NYSDOH          | New York State Department of Health                                   |
| O&M             | Operation and Maintenance   |
| PM              | Project Manager   |
| QA              | Quality Assurance   |
| QC              | Quality Control   |
| QCM             | Quality Control Manger  |
| QCP             | Quality Control Plan  |
| RFI             | Request for Information   |
| ROD             | Record of Decision  |
| SSC             | Site Safety Coordinator   |
| SOP             | Standard Operating Procedure  |
| STC             | Senior Technical Consultant   |
| TO              | Task Order  |

TOH                      Town of Hempstead  
VOC                      volatile organic compound

# 1.0 Introduction

---

AGVIQ-CH2M HILL Constructors, Inc. Joint Venture III (AGVIQ-CH2M HILL) has prepared this Quality Control Plan (QCP) describing the quality control (QC) process for the installation of interim emergency Liquid-Phase Activated Carbon (LPGAC) units to the Aqua New York, Seaman's Neck Road Water Plant, in Levittown, NY. This QCP was prepared under Response Action Contract No. N62470-08-D-1006, Task Order (TO) No. WE23.

## 1.1 Scope of Work

The purpose of this QCP is to outline the required QC procedures that will be employed during the installation of the interim emergency LPGAC units in order to ensure that all work is completed in accordance with the project specifications. Specifically, the QCP focuses on the performance of the following activities:

- Mobilization and site preparation
  - Underground Piping and Utilities
  - Concrete Work
  - Process Equipment, Piping and Valves
  - System Start-Up and Testing
- 
- Demobilization
  - System Operations and Maintenance
  - Temporary LPGAC System Removal

These activities will be performed in accordance with the approved 100% Design Document. Work plan documents will be approved by the Navy before field work begins.

## 1.2 Project Background

This Quality Control Plan is to address construction and startup of a temporary well-head treatment remedy for Aqua New York, Inc. (AQUA-NY) water supply well N-8480 (Well No. 3) located at the Seaman's Neck Road Facility. Trichloroethene has been detected at a maximum concentration of 2.1 micrograms per liter ( $\mu\text{g}/\text{L}$ ) in groundwater. The Navy is currently working with New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH), Nassau County Department of Health (NCDOH), and Town of Hempstead (TOH) to construct a long-term system to remove volatile organic compounds (VOCs) from Well Nos. 3S and 4S. These activities are authorized under the 2001 NYSDEC and 2003 Navy Record of Decision. A Basis of Design Report for the full-scale long-term system was prepared for this system in December 2010, and approval from the NCDOH was received in August 2011 (NCDH 3325-10). In September 2011, a design package was submitted for NCDOH review and comments were received in October and November 2011. NCDOH comments on the full-scale system design are currently being addressed, but submittal of the responses has been delayed to allow for design and submittals for the interim emergency treatment system to proceed. Construction

of the full-scale long-term system is tentatively planned to start in spring 2012 and be completed in the winter of 2013. The interim emergency treatment system is being constructed to protect public health until the final well head treatment system is constructed and placed in operation. The Navy is conducting this action as a “time-critical removal action” under the Navy’s Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) authority.

To meet the needs of the Navy on this project to perform the upgrade of the groundwater treatment system requires the construction/installation of a temporary LPGAC groundwater treatment system that provides additional groundwater treatment prior to transmission to AQUA-NY customers.

### 1.3 Project Objectives

The key objectives of the Implementation of Remedial Action Wellhead Treatment at the AQUA-NY facility project are summarized below:

- Procure, install, and start-up the Interim Emergency LPGAC Wellhead Treatment System per the Tetra Tech NUS, Inc. (TtNUS) design documents (Appendix C of the Work Plan).
- Operate and maintain the temporary LPGAC system while the full scale system is being installed and brought online.
- Minimize the disturbance to plant operation and staff during construction.

## 2.0 Organization and Responsibilities

---

This section discusses the key roles and responsibilities of the project team that will deliver this task order.

### 2.1 Quality Management Roles and Responsibilities

The project organization chart (Figure 2-1) depicts the chain of command for this TO and the individuals responsible for executing the work as indicated. Individual roles and responsibilities of TO personnel are summarized in Table 2-1.

#### 2.1.1 Program Quality Manager – Theresa Rojas

The Program Quality Manager is responsible for developing, maintaining, and ensuring implementation of the quality program on this project. This responsibility includes oversight of activities performed under the guidance of this QCP, conducting periodic reviews of the processes being implemented, and implementing continuous improvement evaluations of the quality program.

#### 2.1.2 Program Health and Safety Manager – Joshua Painter

The Program Health and Safety Manager is responsible for developing, maintaining, and ensuring implementation of the health and safety (H&S) program on this project. This responsibility includes general oversight of activities performed under this TO, conducting periodic reviews and inspections of the H&S procedures being implemented, evaluating any H&S concerns raised by the project team over the course of the project, providing guidance on any H&S issues raised by the team to ensure the safety of project personnel, and implementing continuous improvement evaluations of the H&S program.

#### 2.1.3 Project Manager – Jim Nicotri

The Project Manager (PM) is responsible for the overall execution of the TO. He provides the managerial and administrative skills to ensure that resource allocation, planning, execution, and reporting to meet contract and TO requirements. He is ultimately accountable for all work activities undertaken on this project. The global quality-related responsibilities of the Project Manager can include, but are not limited to, the following:

- Organizes the project team and assign responsibilities
- Understands the contract and scope of work for the specific project
- Communicates to the project team regarding client requirements and quality assurance/quality control (QA/QC) practices
- Identifies, documents, and notifies the client and project team of changes in the scope of work, project documentation, and activities
- Supervises preparation and approval of project-specific procedures, work plans, and quality assurance (QA) project plans
- Approves project design bases, design parameters, drawings, and reports



- Approves project construction methodologies
- Disseminates project-related information from the client such as design bases, input parameters, and drawings
- Serves as liaison for communications with the client and subcontractors
- Serves as liaison between the project team and other internal groups
- Determines whether drawings require independent review
- Investigates nonconformance and implementation of corrective actions
- Evaluates the effect of nonconformance on the project and the appropriateness for reporting such items to the client and provides appropriate documentation for reporting
- Verifies that changes, revisions, and rework are subject to the same QC requirements as the original work
- Serves as final reviewer prior to release of project information
- Approves and signs outgoing correspondence

The PM may delegate some of these responsibilities to the Site Superintendent, Quality Control Manager, or others who will remain onsite for the duration of project field activities as appropriate.

#### **2.1.4 Site Superintendent/Construction Manager – Randy Grogan**

The Site Superintendent is responsible to the PM for efficiently applying the resources of the project team to execute construction. In addition, the Site Superintendent is responsible for ensuring that the construction is conducted in accordance with the work plan and approved design, ensuring appropriate personnel are performing certain tasks, the construction methodology, quality, and safety of the project and the project team during the field work. The Site Superintendent will assist the PM in ensuring that sufficient resources are allocated to maintain project schedule and budget and will provide daily feedback to the PM on project progress, issues requiring resolution, and other project-specific issues, as required. The quality-related responsibilities of the Site Superintendent include, but are not limited to, the following:

- Notifies the PM if the project cannot be completed with regard to quality, schedule, or cost
- Provides oversight and control of subcontractor services
- Serves as liaison for communications with the project staff and subcontractors, as well as with the onsite client representatives
- Continuously monitors work progress, quality, safety, and adherence to authorized work scopes, budgets, and schedules
- Aids in the preparation of construction submittals
- Initiates corrective actions for non-conformance identified onsite
- Leads weekly status meetings
- Reviews the project work plans regularly
- Interfaces daily with the subcontractors

- Prepares and submits Requests for Information (RFIs) and routes them to the PM and Technical Lead for review and approval

### **2.1.5 Project QC Manager /Site Safety Coordinator – Don Conger**

The Project QC Manager (QCM) is responsible for the execution of the project’s construction quality control system and communicates the onsite QA program policies, objectives, and procedures to the project team and subcontractors during project meetings and informal discussions. Onsite technical personnel, which may include a construction QC manager, engineers, chemists, geologists, and scientists, will assist the Project QC Manager in monitoring, controlling, and documenting the quality of the onsite construction, surveying, and other remedial activities. All documentation related to the control of the quality of the project, including analytical test results, inspections, material test results, and audits, will be reviewed or prepared by the Project QC Manager. The Project QC Manager’s duties include the following:

- Three phases of control inspections
- Control testing
- Document control
- Review of submittals
- Completion inspection
- Records Maintenance and Filing
- Conduct of audits and surveillance

The Project QC Manager will also coordinate with and assist the Navy representatives in the performance of QA audits and inspections.

The Site Safety Coordinator (SSC) is responsible for administering the provisions of the Accident Prevention Plan (APP) during the fieldwork. The SSC will ensure that proper H&S precautions are considered and conducted during project implementation. Responsibilities include, but are not limited to, the following:

- Provides H&S oversight of the field team and coordinates with subcontractor H&S representatives
- Serves as liaison for H&S communications with the project staff and subcontractors as well as program H&S team
- Continuously monitors implementation of H&S practices and has the authority to stop work when deemed appropriate
- Aids in the preparation of H&S documentation
- Initiates corrective actions for non-conformance identified onsite
- Leads daily H&S meetings
- Reviews the project work plans regularly

### **2.1.6 Senior Construction Manager – Steve Matney**

The Senior Construction Manager is responsible for identifying the appropriateness of the construction activities selected for the project, evaluates the current site conditions and construction methods used on the project. The Senior Construction Manager’s duties

include identifying appropriate short-term and long-term means and methods for constructing the project. The Senior Construction Manager will also review and guide the preparation of project technical work plans and project completion reports and supervise the field construction staff on the project.

### **2.1.7 Senior Technical Consultant – Russell Ford**

The Senior Technical Consultant (STC) is responsible for reviewing the process information for the treatment system and site and for evaluating the performance of the system. The STC is also responsible for overseeing the construction of the project to ensure compliance with design drawings and specifications and will ultimately certify that the system was installed and operates in accordance with the design drawings and specifications.

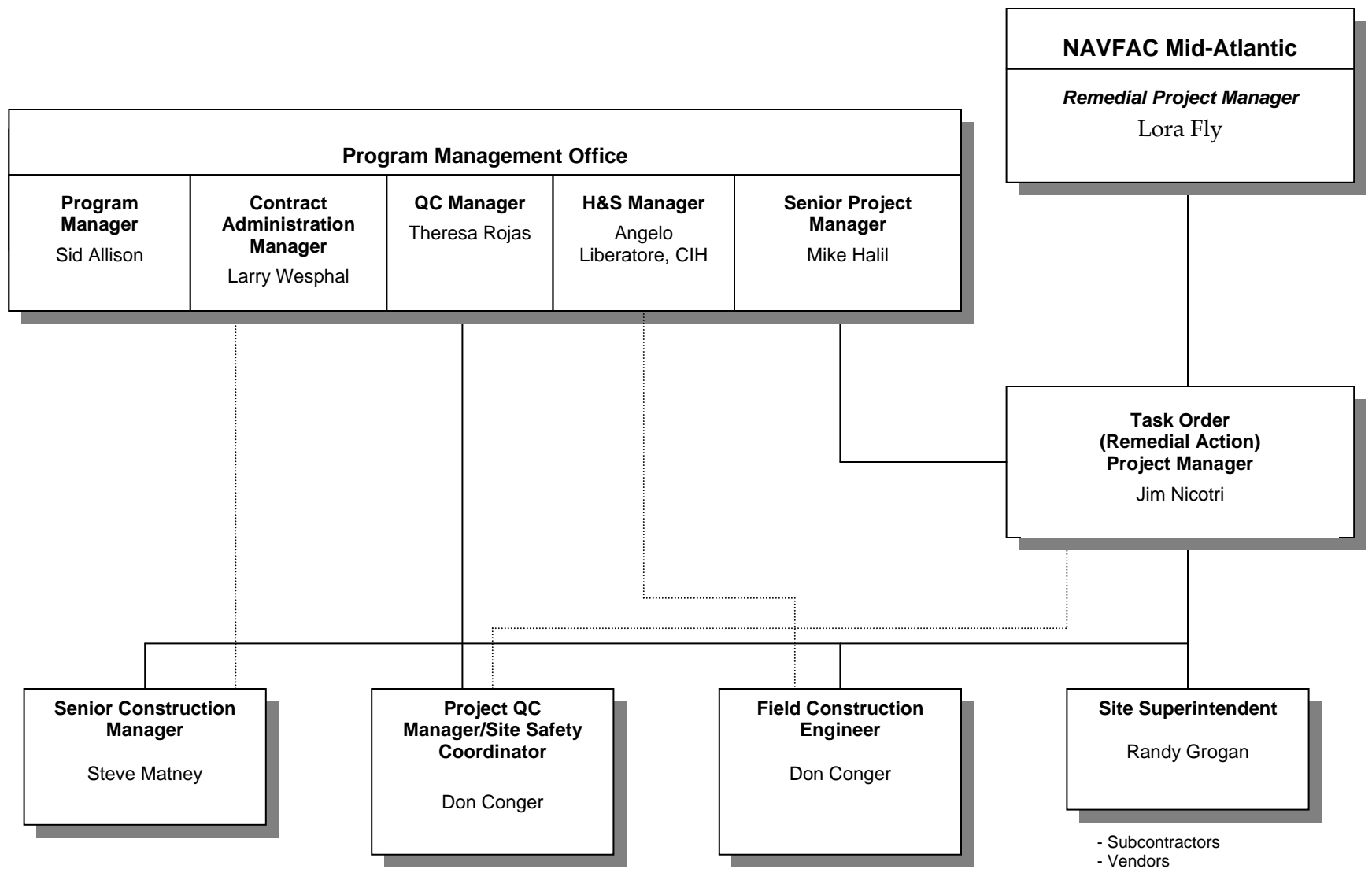
## **2.2 Outside Organizations and Subcontractors**

AGVIQ-CH2M HILL assumes overall responsibility for ensuring conformance of subcontracted materials and services to quality requirements. However, it is the responsibility of subcontractors to plan, manage, and accomplish their activities in accordance with the plans, specifications, and local, state, and federal regulations.

Subcontractors include those organizations supplying services to the project. Subcontractors report directly to the Site Superintendent and are responsible for completing the project-specific activities assigned to them. Subcontractors are also responsible for meeting the quality requirements for materials and workmanship as defined by the Project QC Manager. Subcontractors will verify that construction activities and materials comply with the requirements of the contract plans and specifications.

Services/materials anticipated to be subcontracted for the interim system upgrades include:

- Civil and mechanical subcontractor
- Specialty vendor (LPGAC System)
- Various rental equipment vendors (office trailer, frac tank, etc)
- Chemical laboratory



- Subcontractors
- Vendors

**Figure 2-1**  
Project Organization Chart

**TABLE 2-1  
Roles, Responsibilities, and Authorities of Key Project Personnel**

| <b>Role</b>                                     | <b>Responsibility</b>   | <b>Authority</b>  |
|---|---|---|
| PM  | <p>Management and technical direction of work</p> <p>Communicate with Navy Remedial PM and Navy technical representative</p> <p>Subcontractor management</p> <p>Select TO staff</p> <p>Develop TO Work Plan and supporting plans</p> <p>Meet TO performance objectives</p> <p>Prepare status reports</p> <p>Prepare field change requests</p> | <p>Approve subcontractor selection</p> <p>Approve invoices to the Navy</p> <p>Approve TO baseline schedule</p> <p>Stop work at the site for any reason</p> <p>Approve payment to vendors and suppliers</p> <p>Approve payment to subcontractors</p> <p>Review technical qualifications of subcontractors</p> <p>Respond to Change Notices</p> |
| Site Superintendent/<br>Construction<br>Manager | <p>Responsible for all site activities</p> <p>Provide direction to field personnel and subcontractors</p> <p>Onsite construction management</p> <p>Provide daily status reports</p> <p>Implement TO Work Plan</p> <p>Review subcontractor qualifications</p> <p>Stop work for unsafe conditions or practices</p>                              | <p>Stop site work as necessary</p> <p>Approve corrective action for site inspections and assessments</p> <p>Approve materials and labor costs for site operations</p> <p>Resolve field personnel and/or subcontractor interface issues</p> <p>Approve daily and weekly status reports</p>   |
| Project QC Manager                              | <p>Monitor and oversee implementation compliance with scope of work</p> <p>Document inspections to ensure compliance</p> <p>Review requests for changes in scope of work</p> <p>Recommend improvements in work techniques or metrics</p> <p>Monitor and report on subcontractor quality and quantities</p> <p>Maintain Submittal Register</p> | <p>Complete daily quality report</p> <p>Monitor and report on subcontractor quality and quantities</p> <p>Conduct inspections to ensure compliance</p> <p>Stop work for non-compliant operations</p> <p>Maintain rework items list</p>  |
| SSC   | <p>Monitor and report on field personnel and/or subcontractor safety and health performance</p> <p>Record and report safety statistics</p> <p>Conduct needed site safety and health orientation and daily safety meetings</p> <p>Maintain environmental log</p> <p>Stop work for unsafe practices or conditions</p>                           | <p>Stop work for unsafe practices or conditions</p> <p>Enforce site-specific Accident Prevention Plan</p> <p>Set weekly safety objectives</p> <p>Approve resumption of work for resolved safety issues</p>  |
| Program Quality<br>Manager                      | <p>Coordinate with the Project QC Manager on QCP implementation</p> <p>Provide oversight of the Project QC Manager's role</p> <p>Monitor and audit project quality implementation</p>   | <p>Review and oversight of QCP implementation</p> <p>Coordination with Project Quality Manager and PM on corrective actions</p>   |
| Program H&S<br>Manager                          | <p>Coordinate with the SHSO on H&amp;S implementation</p> <p>Provide oversight of the SHSO's role</p> <p>Monitor and audit project H&amp;S implementation</p>   | <p>Review and oversight of APP implementation</p> <p>Coordination with SHSO and PM on H&amp;S corrective actions</p>  |

## 3.0 Construction Quality Control

---

The construction QC methods applicable to the work activities described for this QCP are outlined in the following subsections. The Project QC Manager and the Construction Manager (Site Superintendent) will verify conformance with the field requirements. The Project QC Manager, or his designee, will perform final inspections of the materials and the overall work activities. These inspections are performed to ensure safe, efficient, high-quality work is performed, while meeting the objectives and requirements of the plans and specifications.

The project tasks for this TO project are grouped into definable features of work (DFOWs), which are work activities that are significant enough to warrant separate inspections. The DFOWs for this project are:

- Mobilization and Site Preparation
- Underground Piping and Utilities
- Concrete Work
- Process Equipment, Piping and Valves
- System Start-Up and Testing
- Demobilization
- System Operations and Maintenance
- Temporary LPGAC System Removal

### 3.1 Procedures for Performing the Three Phases of Control

The DFOWs will be inspected in accordance with the three phases of control – preparatory, initial, and follow-up. An overview of the inspection provisions is outlined in the subsections that follow.

#### 3.1.1 Preparatory Phase

The preparatory phase culminates with the planning and design process. Successful completion of the Preparatory Phase verifies that the TO delivery and project plans have been completed and are ready to be implemented. For each DFOW established in the QCP, the following events must be performed during the preparatory phase by the Project QC Manager in conjunction with the Site Superintendent and the SSC responsible for the DFOW:

1. Confirm that the appropriate technical specifications are incorporated into the project work plan and review specifications.
2. Confirm that the appropriate contract drawings are incorporated into the project work plan and review drawings.
3. Verify that all shop drawings and submittals have been approved by the proper approving authority (including factory test results, when required).

4. Confirm that the testing plan coincides with the work plan and that adequate testing is called for to assure quality delivery.
5. Confirm definition of preliminary work required at the TO work site and examine the TO work area to confirm required preliminary work has been properly completed.
6. Confirm availability of required materials and equipment. Examine materials and equipment to confirm compliance with approved submittals and procedures. Examine mock-ups and any sample work product to confirm compliance with approved submittals.
7. Review the site APP and activity hazard analysis (AHA) to ensure that safety concerns are adequately addressed and applicable safety requirements have been incorporated into the plan. Confirm that the appropriate material safety data sheets have been identified and properly submitted.
8. Discuss construction methods to be employed during the activity. Identify checkpoints and areas of evaluation that will allow confirmation that the appropriate quality of construction is being achieved.
9. Confirm permits and other regulatory requirements are met.

The Navy's Contracting Officer (CO) or designated representative must be notified at least 2 working days in advance of each preparatory phase. Results of the activity are to be documented in the Preparatory Phase Report and attached to the Contractor QC Report (CQCR).

### **3.1.2 Initial Phase**

The initial phase occurs at the startup of each construction activity associated with a specific DFW. The initial phase confirms that the QCP is being effectively implemented and the desired results are being achieved. As is the case with the preparatory phase, proper notification to the Navy's CO or designated representative is required when crews are ready to start work on a DFW.

During the initial phase, the initial segment of the DFW is observed and inspected to ensure that the work complies with contract and specification requirements. The initial phase should be repeated when acceptable levels of specified quality are not being met.

The following shall be performed for each DFW:

1. Establish the quality of workmanship required to properly deliver the TO in accordance with contract requirements. The Project QC Manager ensures that the Site Superintendent has made the work crews aware of expectations associated with the construction methods established under the preparatory phase. This assurance is to be achieved via observation of the initial work activities as well as interaction with the Site Superintendent and responsible subcontractor.
2. Resolve conflicts. The Project QC Manager will guide the Site Superintendent and responsible foreman in resolving conflicts. Should conflicts arise in establishing the baseline quality for the DFW, the responsibility to resolve the conflict falls to the Project QC Manager. Should the conflict not be resolved in a manner that satisfies the contract requirements, the Project QC Manager must elevate the conflict to the Project

Manager and, if needed, the Program Quality Manager and issue a non-conformance report. The Project QC Manager may direct a “stop work” order for that activity, with the concurrence of the Project Manager, should the issue jeopardize the results of the DFW or put the TO at risk of non-compliant performance.

3. Evaluate the site APP and AHA against actual work conditions with the Site Superintendent and responsible foreman to ensure that the AHA conducted to prepare the plan adequately addressed field conditions. Confirm that applicable safety requirements are being implemented during construction activities.
4. Observe and evaluate the performance of testing technicians. Confirm with the Site Superintendent and/or responsible subcontractor that testing is being performed in accordance with the testing plan and that all required protocols are being observed. Review all reports and documentation associated with extraction, packaging, transporting, and testing of samples. Note any discrepancies and direct correction accordingly.

Upon completion of the initial phase activities, results are to be documented in the CQCR. Should results be unsatisfactory, the initial phase will be rescheduled.

### 3.1.3 Follow-up Phase

Completion of the initial phase of QC activity then leads directly into the follow-up phase, which addresses the routine day-to-day activities on the construction site. Inspection activities associated with each DFW are to be documented in the CQCR. Specific concerns associated with the follow-up include:

1. Inspection of the work activity to ensure work is in compliance with the contracted remedial action
2. Evaluation and confirmation that the quality of workmanship is being maintained at a level no less than that established during the initial phase
3. Evaluation and confirmation that required testing is being performed in accordance with procedures established during the preparatory phase and confirmed during the initial phase
4. Confirmation that non-conforming work is being corrected promptly and in accordance with the direction provided by the Project QC Manager

The follow-up phase inspections should be performed daily, or as identified in the QCP until the completion of each DFW.

## 3.2 Mobilization and Site Preparation

Mobilization and site preparation will consist of mobilizing personnel, equipment and supplies to the work site and establishing temporary facilities, site support area and any additional work zones necessary for the prosecution of the work. As part of the mobilization, a pre-construction meeting will be held with the project team and facility personnel to review the project objectives, the overall project scope and schedule, lines of communications, and reporting. A preparedness check will verify that site preparation



provisions, such as permitting/approvals, utility clearances, demarcating the work zones, and staging of equipment and material, are in place to begin the work. Additionally, requirements for equipment and material deliveries will be discussed as this work is being conducted in an active construction site at an operating drinking water treatment facility.

Site preparation will commence after mobilization is complete and includes the onsite construction activities associated with the surface and subsurface work required to prepare the site for construction. Site preparation consists of the following construction components:

- Stake-out limits of construction locations and other important features such as water main centerlines and temporary concrete pad corners.
- Post safety signs, temporary security fencing, tree protection fencing, flagging, and other access restrictions.
- Coordinate temporary and relocated utilities to keep the existing treatment plant functional and remove/cap utilities as needed to perform the scope of work.
- Clearing of vegetation and non-suitable soils where the temporary pad area as shown on the Technical Drawings.

### **3.2.1 Preparatory Phase**

The preparatory phase will include a review of the APP and relevant AHAs, the construction sequence, communications matrix, project schedule, submittal status based on review of the project Submittal Register, and confirmation that appropriate materials and equipment are onsite or are in the process of mobilizing to the site. The respective responsibilities and scope of services for the subcontractors will be outlined as well.

### **3.2.2 Initial Phase**

Inspections will be conducted as necessary to verify that construction limits are defined, utilities are marked, and material is staged in the designated areas. Evaluation of work area signage, demarcation of the construction work areas, and evaluation of environmental-best management practices will be performed. Communications with facility personnel regarding general site conditions, traffic flow and control, status of utilities (electrical, plant air, compressed air, water, etc.) will be documented; any deficiencies will be noted and corrected as deemed necessary.

### **3.2.3 Follow-up Phase**

The Project QC Manager will provide continuous oversight of the site preparation activities to verify that the work is completed in accordance with the requirements provided in the design and facility rules. Deficiencies will be noted and corrected.

Table 3-1 lists the QC procedures that will be implemented during mobilization and site preparation activities.

TABLE 3-1  
QC Procedures for Mobilization and Site Preparation

| Task                        | Procedures/Construction Details  |
|-----------------------------|--|
| Pre-construction Meeting    | <ul style="list-style-type: none"> <li>• Conduct a pre-construction meeting and prepare meeting minutes.</li> <li>• Obtain subcontractor Performance and Payment Bond, insurance certificates and personnel training records.</li> <li>• Verify dig permit and utility clearance from the facility and utility locates, respectively.</li> <li>• Coordinate utility and water tie-ins.</li> <li>• Verify designated locations of equipment layout, material and waste staging areas, other support areas as needed.</li> <li>• Verify spill prevention and recovery plan in place.</li> <li>• Verify sufficient equipment and supplies on hand.</li> </ul> |
| Site Walk                   | <ul style="list-style-type: none"> <li>• Verify site layout plan.</li> <li>• Verify Environmental Conditions Report – for documenting existing conditions.</li> <li>• Identify all associated utilities.</li> <li>• Update plan drawings with any known utilities.</li> <li>• Verify Waste collection system in place and appropriate for the job</li> </ul>   |
| Pre-construction Submittals | <ul style="list-style-type: none"> <li>• Review details of the plans and specifications (including subcontractor plans).</li> <li>• Review Submittal Register.</li> <li>• Accident Prevention Plan with AHAs.</li> <li>• Personnel qualification and certifications, including subcontractor personnel.</li> </ul>   |

### 3.3 Underground Piping and Utilities

Modification of the existing treatment system requires installation of a temporary LPGAC. In order to accommodate these changes, trenching for installation of piping and valves must be completed as shown in the technical drawings. Installation of underground utilities, piping and conduit will be completed prior to or concurrent with the installation of the concrete pad or GAC units.

Utility tie-ins and AQUA water distribution connections will be phased-in during construction activities. All tie-ins and connections must be coordinated with AQUA-NY through AGVIQ-CH2M HILL. AQUA will install a valve and piping stub where the Subcontractor will tie in the facility piping for the GAC system.

Final tie-in to existing water mains will be by AQUA-NY. The subcontractor shall coordinate all tie-ins with AGVIQ-CH2M HILL and AQUA-NY.

#### 3.3.1 Preparatory Phase

The preparatory phase will include the following: reviewing the relevant AHAs; reviewing the requirements provided in the design for pads and foundations, integration system piping, and ancillary components and verifying acceptance and approval of the utility clearance; review of lock-out/tag-out procedures; and ensuring that waste staging areas will be prepared and managed in accordance with the protocols of the Waste Management Plan.

### 3.3.2 Initial Phase

As the installation work activities proceeds, the Project QC Manager will conduct initial inspections to ascertain whether the underground piping is being installed in accordance with the project plans and specifications. Coordination of utility connects or disconnects, communications with existing WTP personnel and facility operations will be performed.

Any deficiencies noted will be documented and corrected as necessary.

### 3.3.3 Follow-up Phase

The Project QC Manager will be responsible for the ongoing inspection of underground piping installations and utility connections as they occur. Surveillance will verify that the work is being completed according to design specifications and all necessary communications between AGVIQ-CH2M HILL and AQUA NY are being completed prior to utility connections being made.

Table 3-2 lists the QC procedures that will be implemented during underground piping and utility installation.

TABLE 3-2  
QC Procedures for Underground Piping and Utilities

| Task               | Procedures/Construction Details   |
|--------------------|---|
| Material Receiving | <ul style="list-style-type: none"> <li>• Visual inspection of material upon arrival to the site for damages</li> <li>• Check type and quantities of arrived materials against purchase order, shipping label, and confirmation lists. Note any incorrect quantities, incorrect type and models, and missing items</li> <li>• Visual inspection on the quality of the material if the material has manufacturer-specified grade or quality rating</li> <li>• Inspect and verify the received materials that they were built or manufactured in accordance to manufacturer specifications and/or data</li> <li>• Document and report material/product deficiencies and/or irregularities immediately to Project QC Manager</li> </ul> |
| Submittals         | <ul style="list-style-type: none"> <li>• Verify site layout plan</li> <li>• Check plans and specifications (including subcontractor plans)</li> <li>• Review Submittal Register, inspect equipment against approved submittals</li> <li>• Review personnel qualification and certifications, including subcontractor personnel</li> <li>• Identify all associated utilities</li> <li>• Obtain hydrostatic pressure testing for piping</li> <li>• Update plan drawings with any known utilities</li> </ul>   |
| Installation       | <ul style="list-style-type: none"> <li>• Identify all associated utilities</li> <li>• Perform red-lined updates of field drawings</li> <li>• Oversee performance of hydrostatic testing</li> <li>• Oversee performance of pipe leakage testing</li> <li>• Oversee performance of valve testing</li> <li>• Oversee bacteriological disinfection of newly installed piping</li> <li>• Ensure installation of ancillary equipment in accordance with manufacturer literature</li> <li>• Function test entire system sequence of operation</li> </ul>   |

## 3.4 Concrete Work

Erosion and sediment controls will be installed before land disturbance begins. Stormwater management provisions will be considered during construction. Additionally, equipment staging and construction support zones will be established before materials and equipment are delivered. Civil construction activities will be performed to prepare the subgrade for installation of the concrete slab which the LPGAC units will be placed and for the preparation of the base the frac tank will be placed.

Installation of the foundation will begin once site preparation is completed. Activities will include but not be limited to the following:

- Install concrete pad (slab on grade) as shown in the Technical Drawings. The concrete pad shall be constructed as described in the technical specifications Section 01 01 00 and drawings and as described in the Work Plan.
- Prepare a stable base and install the temporary used backwash tank (20,000 gallons) for draining the tanks.

Fill beneath both the concrete pad and the backwash waste holding tank shall be placed in lifts not to exceed six inches, and compacted to not less than 95% of maximum dry density (ASTM D 698).

Due to the time of year, a cold weather concrete mix will be required. The subcontractor shall also be responsible for protection and heating of the slab during the curing period, per the recommendations of the concrete supplier.

Structures shown on the drawings have been designed for stability under final conditions only. Subcontractor is responsible for all work relating to construction methods, bracing, shoring, rigging, formwork, and other work aids required to safely perform the work.

### 3.4.1 Preparatory Phase

The preparatory phase will consist of coordination with the civil construction subcontractors. The work activities of the respective subcontractors will be discussed. The testing requirements for the sub grade, concrete, and any other utilities will be reviewed. As with all work activities, the relevant AHAs, the site-specific APP, and relevant design drawings and specifications will be reviewed.

### 3.4.2 Initial Phase

As the civil construction activities progress, the Project QC Manager will conduct initial inspections and monitor the work completed to verify conformity with the design and specifications. Scheduling with the laboratory performing the concrete testing will be coordinated.

The focus of the initial phase is on the workmanship applied in forming the foundations, the concrete pour, and performance of concrete testing. Any deficiencies noted will be documented and corrected as necessary.

### 3.4.3 Follow-up Phase

The Project QC Manager will be responsible for the ongoing inspection of civil construction activities. Surveillance will verify that the work is being completed in accordance with the design and specifications.

Table 3-3 lists the QC procedures that will be implemented during civil construction.

TABLE 3-3  
QC Procedures for Civil Construction (concrete pad and base preparation)

| Task               | Inspection/Construction Control   |
|--------------------|---|
| Civil Construction | <ul style="list-style-type: none"> <li>• Maintain chronological journal of visual observations as work activities progress and document with photo log.</li> <li>• Verify that the utility locate is performed and site drawings are marked up.</li> <li>• Evaluate sub grade contour and soil/aggregate condition suitable for foundation support.</li> <li>• Verify subgrade density testing.</li> <li>• Receive/ inspect the forms for the foundation.</li> <li>• Verify that the testing facility is accredited for concrete test methods.</li> <li>• Ensure stability of forms and plumb.</li> <li>• Inspect erosion and sediment controls; document results.</li> <li>• Obtain mix design for concrete.</li> <li>• Oversee collection of concrete test cylinders and onsite sampling/testing.</li> <li>• Obtain delivery tickets for concrete; record field conditions, sketch locations of pour.</li> <li>• Verify detail and layout of walkway and foundations.</li> <li>• Inspect materials and equipment upon delivery.</li> <li>• Assess compaction effort for foundation granular fill.</li> <li>• Verify anchor bolt design and placement with GAC vessel supplier.</li> </ul> |

## 3.5 Process Equipment, Piping and Valves

Once the foundation has been installed and cured, installation of the carbon vessels and associated piping and equipment can proceed. Equipment installation will commence with the delivery of the GAC system through completion of the field activities associated with the system installation. Equipment installation consists of the following construction components:

- Receive a LPGAC system. Unload and install activated carbon units, piping, and accessories prior to making connections to the existing system.
- Furnish and install all piping, valves, monitoring equipment (flow and pressure), and appurtenances for the interim emergency LPGAC systems to function.
- Supply all piping, valves, monitoring equipment (flow and pressure), and appearances to be installed on the temporary equipment pad, as outlined on drawing PID-2. The Subcontractor will be responsible for installing all equipment per the manufacturer’s recommendations.
- Supply all piping, valves, monitoring equipment (flow and pressure), and appurtenances (including bolts to connect piping to equipment on the equipment pad) to be installed outside of the temporary equipment pad as outline on drawing PID-2. The Subcontractor will be responsible for installing all equipment. The Subcontractor

will also be responsible for providing and installing all pipe supports as indicated on the drawings and as needed.

- Procure and install the 20,000-gallon temporary storage tank for collection of backwash water.

### 3.5.1 Preparatory Phase

The preparatory phase for the process equipment, piping and valves will focus on the H&S requirements for lifting and hoisting, communications, appointing the competent person for rigging, reviewing the electrical wiring and structure grounding requirements, and coordinating the material and equipment deliveries.

The quality verification requirements will be discussed. This will include a discussion of submittal status, material and equipment delivery, inspections (torque, plumb check, spacing, balance; etc.), and testing as required.

### 3.5.2 Initial Phase

This phase includes overseeing the assembly of the system in accordance with the project plans and specifications. The Project QC Manager will maintain routine communication with the subcontractor responsible for QC throughout the installation leading up to the pre-final inspection.

### 3.5.3 Follow-up Phase

This phase includes routine inspections and observations of the materials, workmanship, and quality checks per the project plans and specifications.

Table 3-4 lists the QC procedures that will be implemented during installation of the process equipment, piping and valves.

TABLE 3-4  
QC Procedures for Installation of Process Equipment

| Task                           | Inspection/Construction Control   |
|--------------------------------|---|
| Process Equipment Installation | <ul style="list-style-type: none"> <li>• Receive materials list and inspect materials received against specifications</li> <li>• Review and approve subcontractor lift plan</li> <li>• Observe and test bolts: torque, spacing, type, length, spacers, washers, etc.</li> <li>• Verify locations of anchors; anchor and dowel conform with specifications</li> <li>• Inspect anchor bolt installation: type, location, torque, and material type</li> <li>• Observe testing of accessories in accordance with manufacturer's instruction; record test results and observations</li> </ul> |

## 3.6 System Startup and Testing

Installation of the interim emergency GAC system will be performed in a planned, logistical approach to ensure safe, efficient installation of the designed system. Provisions for preserving the operability of the treatment system in its original design, while integrating the interim system and ancillary components are of paramount importance. It is critical that the safety plan and AHAs are closely followed and updated as site conditions and equipment function dictate. Certain requirements, such as those required by National

Electric Code, National Fire Protection Association, Occupational Safety and Health Administration, permit requirements, etc., were considered during the design of the system and will be referred to during system construction and pre-commissioning. Examples of controls include ground fault circuits, system interlocks, the programmable logic controller; and signage for voltage, labeling, noise protection, and etc. Multiple planning meetings associated with the system installation and O&M are envisioned.

Permit requirements, the delivery and installation schedule for major system components and calibration of essential monitoring devices are highly important to the successful completion of construction so start-up can begin. Startup will follow a logical approach to ensure protection of workers and the environment. The pre-start safety orientation will kick off the commissioning operations.

AGVIQ-CH2M HILL will be responsible for starting up of the system and initial check-out. Equipment testing, prove out, and startup testing in accordance with the Design Package. Since the finished water will be used for distribution to the public, maintaining or sterilizing equipment surfaces in contact with the water is critical. Anticipated activities include, but are not limited to the following.

- Sterilizing potable water piping and GAC units
- Activated carbon will be provided and installed by the GAC vendor. However, AGVIQ-CH2M HILL shall assist with the initial flushing of the GAC to the backwash holding tank.
- Filling, backwashing, and sterilization of GAC shall be conducted by AGVIQ-CH2M HILL per the GAC Suppliers recommendations, and as described in the Design Specifications, Sections 33 11 00, 40 05 13, and 43 31 13.
- Once the system has been sanitized and backwashed, AGVIQ-CH2M HILL will sample the carbon and effluent water for VOC, metal, and bacterial counts and submit these samples to the testing laboratory
- Confirmation that the GAC systems and ancillary equipment operate properly and function as intended

Turnover of the system shall be performed after the punch list has been completed, the system has been started up and the system has been proven to operate in accordance with the specifications for at least 24 hours.

### 3.6.1 Preparatory Phase

During this phase, the specifications for the interim emergency LPGAC system, manufacturer's literature, status of submittals, a review of the testing (electrical, mechanical, pipe leakage, hydrostatic test, etc.) requirements, and the project APP will be reviewed. Coordination of utility connects or disconnects, communications with AQUA-NY water treatment plant personnel and facility operations will be performed. Also, the project schedule will be reviewed.

### 3.6.2 Initial Phase

Inspections, observations, and documentation of testing will take place throughout the initial and follow-up phases. When deemed necessary, the Project QC Manger may propose revisiting the preparatory phase to eradicate inefficiencies or quality workmanship concerns.

### 3.6.3 Follow-up Phase

The Project QC Manager will provide continuous oversight of the installation activities to verify that the work is completed in accordance with requirements listed in the design and specifications, or communicated and agreed upon during the preparatory phase meeting. Deficiencies will be noted and corrected.

Table 3-5 lists the QC procedures that will be implemented during installation of the LPGAC system.

TABLE 3-5  
QC Procedures for Interim Emergency GAC System

| Task               | Procedures/Construction Details  |
|--------------------|--|
| Material Receiving | <ul style="list-style-type: none"> <li>• Visual inspection of material upon arrival to the site for damages</li> <li>• Check type and quantities of arrived materials against purchase order, shipping label, and confirmation lists. Note any incorrect quantities, incorrect type and models, and missing items</li> <li>• Visual inspection on the quality of the material if the material has manufacturer-specified grade or quality rating</li> <li>• Inspect and verify the received materials that they were built or manufactured in accordance to manufacturer specifications and/or data</li> <li>• Document and report material/product deficiencies and/or irregularities immediately to Project QC Manager</li> </ul>  |
| Submittals         | <ul style="list-style-type: none"> <li>• Verify site layout plan</li> <li>• Check plans and specifications (including subcontractor plans)</li> <li>• Review Submittal Register, inspect equipment against approved submittals</li> <li>• Review personnel qualification and certifications, including subcontractor personnel</li> <li>• Identify all associated utilities</li> <li>• Obtain hydrostatic pressure testing for vessels letters from factory</li> <li>• Update plan drawings with any known utilities</li> </ul>  |
| Installation       | <ul style="list-style-type: none"> <li>• Identify all associated utilities</li> <li>• Demonstrate that flow and pressure measuring devices are accurate/calibrated</li> <li>• Perform red-lined updates of field drawings</li> <li>• Ensure calibration equipment has documentation of calibration</li> <li>• Oversee performance of pipe leakage testing</li> <li>• Verify tanks are level and anchored</li> <li>• Record instrument and gauge calibration data</li> <li>• Document results of function testing for system, two cycles</li> <li>• Observe wiring and electrical connections</li> <li>• Ensure installation of ancillary equipment in accordance with manufacturer literature</li> <li>• Function test entire system sequence of operation</li> <li>• Verify labeling of tanks, piping, power boxes</li> </ul> |



## 3.7 Demobilization

Demobilization includes site restoration which consists of restoring the site to pre-construction conditions, including repair or replace asphalt, concrete (including curb), fence, grass, trees, decorative planting, or other permanent site features that were disrupted during construction to visual acceptance or otherwise working condition.

Pre-final inspection of the site will be performed by the Site Superintendent/Construction Manager and the Project QC Manager. Final equipment inspections will be performed and documented by the Project QC Manager or by his/her designee.

Other than the O&M portion of the work, equipment and personnel will demobilize from the site following the completion of the work activities identified in the design and specifications. The Project QC Manager will verify that the project objectives associated with construction have been met. A final inspection will be conducted to verify completion of all project activities. Findings, should any be identified, will be tracked, resolved, and documented during a final site walk-through inspection that will include facility operations personnel and other stakeholders.

### 3.7.1 Preparatory Phase

The preparatory phase will include a review of the project schedule and any action items documented over the course of the project. Unresolved actions will be documented and a corrective action plan will be prepared by the responsible party(ies).

### 3.7.2 Initial Phase

The Site Superintendent/Construction Manager and QC Manager will perform inspections to confirm that the work items have been completed to the satisfaction of AGVIQ-CH2M HILL and the Navy.

### 3.7.3 Follow-up Phase

The Project QC Manager will provide continuous oversight of site restoration and demobilization activities to verify that the work is completed in accordance with the requirements provided in plan documents. Deficiencies will be noted and corrected.

Table 3-6 lists the QC procedures that will be implemented during site restoration demobilization.

TABLE 3-6  
QC Procedures for Demobilization

---

| <b>Task</b> | <b>Inspection/Construction Control</b> |
|-------------|--|
|-------------|--|

---

TABLE 3-6  
QC Procedures for Demobilization

| <b>Task</b>    | <b>Inspection/Construction Control</b>  |
|----------------|---|
| Demobilization | <ul style="list-style-type: none"> <li>• Verify Waste is correctly staged, labeled, and inventoried</li> <li>• Inspect Work areas to ensure all temporary facilities, equipment, and materials are safely removed from the site</li> <li>• Verify all site restoration work is completed and site has been restored to pre-construction condition</li> <li>• Inspect Work areas provided to ensure proper housekeeping and cleaning</li> <li>• Verify Completion of inspection when work is complete</li> <li>• Review Punch lists on outstanding items</li> <li>• Verify Final Inspections--all task order areas</li> <li>• Document Orderly site demobilization</li> <li>• Collate site records &amp; documents</li> <li>• Ensure Records and documentation transfer to home office</li> <li>• Perform Purchase order closeouts</li> <li>• Review Final reports &amp; deliverables</li> </ul> |

## 3.8 System Operation and Maintenance

AGVIQ-CH2M HILL will provide an Operation and Maintenance (O&M) manual for the GAC system, including operating and maintenance procedures and a list of recommended spare parts.

The GAC Supplier will develop the O&M Manual and submit it to AGVIQ-CH2M HILL who will submit the O&M Manual to the Navy and other applicable stakeholders for review.

### 3.8.1 Preparatory Phase

The preparatory phase will include a review of the updated O&M manual procedures, the site-specific APP, the Waste Management Plan, and relevant AHAs.

### 3.8.2 Initial Phase

The Project QC Manager will perform inspections to confirm that the objectives of the startup activities have been met and that the rework items, if any, have been completed to the satisfaction of AGVIQ-CH2M HILL and the Navy.

### 3.8.3 Follow-up Phase

The Project QC Manager will provide continuous oversight of the start-up activities to verify that the work is conducted in accordance with the requirements provided in this QCP. Deficiencies will be noted and corrected.

Table 3-7 lists the QC procedures that will be implemented for O&M.

TABLE 3-7  
QC Procedures for O&M

| <b>Task</b> | <b>Inspection/Construction Control</b> |
|-------------|--|
|-------------|--|

TABLE 3-7  
QC Procedures for O&M

| Task | Inspection/Construction Control   |
|------|---|
| O&M  | <ul style="list-style-type: none"> <li>• Verify that the O&amp;M manual includes vendor- and supplier-provided cut sheets, maintenance schedules, and repair procedures for the various pieces of equipment installed in the system.</li> <li>• Ensure that the site visit form is used to document actions taken during site visits.</li> <li>• Ensure draft and final versions of the O&amp;M manual are prepared during the installation process.</li> <li>• Verify that the O&amp;M manual is maintained at the site in a binder along with material safety data sheets and other related information.</li> <li>• During the first month of O&amp;M activities, ensure that weekly visits are made to optimize system performance and that subsequent site visits occur to check routine system operations every other week.</li> </ul> |

### 3.9 Temporary LPGAC System Removal

The temporary system shall not be removed until the temporary system is no longer needed. It is expected that Well # 3 will no longer be needed and shut down sometime between October and December 2012. AGVIQ-CH2M HILL will provide Temporary LPGAC System Removal Quality Control information in the full system Quality Control Plan.

### **3.10 Pre-Final Inspection**

The Navy may perform a pre-final inspection to verify that the facility or work area is complete and ready to be occupied. A government “pre-final punch list” may be developed as a result of this inspection. Each deficiency noted in the punch list will reference the applicable specification paragraph, or drawing number that the deficiency stems from. The Project QC Manager will ensure that items on this list are corrected before notifying the Navy that a final inspection with the stakeholders can be scheduled. Items noted on the “pre-final” inspection will be corrected in a timely manner and will be accomplished within the time slated for completion of the entire work or a particular increment thereof if the project is divided into increments by separate completion dates.

### **3.11 Final Acceptance Inspection**

The Project QC Manager, Site Superintendent/Construction Manager, Senior Technical Consultant, and Navy representatives will be in attendance at the final acceptance inspection. Other government personnel and stakeholders may be in attendance. A final acceptance inspection will be considered closed when the work has been accepted by the Navy technical representative or designated representative.

# 4.0 Testing Requirements

---

AGVIQ-CH2M HILL will conduct quality assurance for the project and the Subcontractor shall conduct quality control as detailed in the project specifications. AGVIQ-CH2M HILL will provide a laboratory to conduct water quality analytical tests to determine compliance with the specifications for the project. This laboratory will analyze water samples to determine water quality for compliance with project specifications. Concrete and material testing shall be the responsibility of the Subcontractor, and shall be performed per the design specifications.

Laboratories performing testing or analysis of materials and environmental samples, or craftsman performing independent testing will be certified or qualified to perform the respective testing. This section summarizes the onsite field testing planned for the project. Details of equipment, materials, products, and construction activities are outlined in the 100% Design Documents. Samples of media requiring definitive chemical analyses will be performed by an approved offsite laboratory.

Individuals performing sampling shall provide evidence of meeting the experience and training requirements in the Navy's *Installation Restoration Program Chemical Data Quality Manual* (IR CDQM) (FESC SP-2056-ENV, Naval Facilities Engineering Service Center [NFESC], 1999).

## 4.1 Certification of Chemical Laboratories

Environmental testing laboratories that will be used for this TO will function as a subcontractor to AGVIQ-CH2M HILL. The analytical laboratory, yet to be contracted, will be NFESC-approved, will maintain National Environmental Laboratory Accreditation, and will be certified by the state of New York for all sample analyses.

## 4.2 Certification of Concrete Laboratories

Concrete will be sampled and field tested onsite and also tested offsite at an approved laboratory. Testing laboratory(ies) used will be certified by the National Institute of Standards and Technology, the National Voluntary Laboratory Accreditation Program, the American Association of State Highway and Transportation Officials, or the American Association for Laboratory Accreditation; or they may be actively participating in an another accreditation program that may be evaluated for acceptance.

## 4.3 Test Plan and Log

The general testing requirements are shown in Table 4-1. The Testing Plan and Log (provided in Attachment A) will be used to record the results of testing. Detailed records of testing will be included in the CQCR as testing is performed and will be documented in the Monthly Summary Report of Field Tests.

TABLE 4-1  
Testing Requirements

| Test/Inspection  | Requirement/Reference  | Frequency  |
|--|--|--|
| Hydrostatic Testing of Piping Systems                  | Not less than 1.5 times the design pressure /ASME B31.3  | Once   |
| Hydrostatic Testing of GAC Vessels                     | 125 PSI for 1 hour   | Once   |
| Pipe leakage Tests                                     | 200 PSIG Pressure for a minimum 2 hours with no less than 5 PSI drop in pressure   | Once, after completion of hydrostatic pressure tests   |
| Valve Operation Test                                   | Open and Close smoothly with operating pressure on one side and atmospheric pressure on the other and in both directions for two-way valve applications          | Once   |
| Laboratory Density Testing                             | Maximum dry density test (ASTM D 698)  | One per each type of material to be used for bedding   |
| Field Compaction Testing (slab sub grade)              | 6 inch lifts compacted to 95% of maximum dry density (ASTM D 1556/2922)  | Once per lift of every 100 SF of slab  |
| Field Compaction Testing (Trench bedding and backfill) | 9 inch lifts compacted to 95% of maximum dry density (ASTM D 1556/2922) for bedding (90% for backfill)   | Once per lift of every 250 LF of trench bedding/backfill material  |
| Concrete Samples for Testing                           | Collect fresh samples of concrete to perform the tests specified / ASTM C 172. ASTM C31/31M for making test specimens  | As needed  |
| Concrete Slump Testing                                 | 4 inches (+/- 1 inch) / ASTM C 143/143M  | At commencement of placement when test cylinders are made for each batch (minimum) or every 20 CY (maximum)  |
| Concrete Temperature Testing                           | When ambient temperature is 41 degrees F or below and 80 degrees F or above (specification Section 3.9.8 and 3.10.3.2 of Section 03 30 00 Cast in Place Concrete | for each batch (minimum) or every 20 CY (maximum) until the specified temperature is obtained and whenever test cylinders and slump tests are made |
| Concrete Air Content                                   | 6 % (ASTM C 173/173M or ASTM C 231)  | Same as slump testing  |
| Cast-in-Place Concrete: Concrete Pad (Slab on Grade)   | Compressive Strength: 4,500 psi @ 28 days<br>ASTM C39 / C 39M  | See Section 3.10.3.3 of the project specifications Section 03 30 00 Cast in Place Concrete   |
| Wires and Cables                                       | Continuity – megger test, grounding resistance, hand-off-auto function test, record voltage  | During installation, prior to energizing system, then prior to startup.  |
| Instrument Calibration                                 | Per manufacturer's recommendations   | Prior to installation, then after repairs or replacement.  |
| Treatment System Equipment Startup and Testing         | Function test valves, meters, gauges, switches and controls  | Per the work plan, design drawings and specifications, and in accordance with the O&M manual.  |
| Influent and effluent system sampling                  | Bacteria, VOCs (TCE), arsenic, iron  | Per the work plan and specifications (Sections 4.1.7 and 4.1.8 of Work Plan)   |

# 5.0 Project Meetings

---

## 5.1 Pre-construction Meeting

The PM will schedule and administer a pre-construction meeting at the site after Notice to Proceed and before the start of construction at the site. During the conference, ground rules and understandings will be established with the Navy, AQUA-NY representatives and its stakeholders, and AGVIQ-CH2M HILL. The purpose of this meeting is to ensure that all parties involved in the project understand and agree on the project goals and objectives, schedule, submittal requirements, documentation requirements, change management processes and procedures, construction means and methods, reporting and communication requirements, H&S requirements and protocols, etc.

The meeting agenda will include the following:

- Designation of responsible personnel
- Lines of authority and communication
- H&S requirements and procedures
- Use of the site for storage, vehicle parking, access routes, and other site requirements
- Coordination with other contractors and owner
- Temporary facilities and controls provided by AGVIQ-CH2M HILL
- Field offices
- Survey, containment facility, and layout
- Security and housekeeping procedures
- Procedures for processing field decisions, submittals, substitutions, applications for payments, proposal requests, field orders, work change directives, change orders, and closeout procedures
- Progress schedules
- Procedures for testing and inspection
- Procedures for maintaining record documents

Minutes of the meeting will be prepared by the AGVIQ - CH2M HILL representative and distributed to the participants and those affected by decisions made. At a minimum, the AGVIQ-CH2M HILL project team and major subcontractors will be in attendance at this meeting.

## 5.2 Coordination and Mutual Understanding Meeting

Before the start of any onsite activities, the PM and Project QC Manager shall meet with the Navy's CO or designated representative to review the QCP and the QC Program required by the contract. The purpose of the meeting will be to confirm that the Project QC Manager and Navy's CO or designated representative clearly understands and agree on:

- Specific QC points of concern on the features of work
- Forms to be used on the project and the correct protocol for use of each form
- Administration of both onsite and offsite work
- Duties and responsibilities of all AGVIQ-CH2M HILL personnel on the site

The meeting shall be attended by the PM, Project QC Manager, Site Superintendent, and SSC. The meeting can also be combined with the pre-construction conference. Minutes of the meeting shall be prepared by the Project QC Manager and signed by both the Navy's CO or designated representative and AGVIQ-CH2M HILL's representative.

## 5.3 QC Meeting

After the start of site work, the Project QC Manager shall conduct QC meetings at a frequency established as necessary by the pace of the work, or as required by the Navy's CO or designated representative. Typically, meetings are expected to occur at least weekly or more frequently, depending on the project needs. Conducting the meetings and preparing the meeting minutes are responsibilities of the Project QC Manager. Annotation of conducting the meeting will be made in the daily contractor QC report. The meeting shall be attended by the Site Superintendent, SSC, and the foreman responsible for the upcoming work. The Navy's CO or designated representative shall be invited to all meetings. To optimize time, these meetings should be held in conjunction with other meetings (for example progress meetings, weekly safety meetings) where possible. As a minimum, the following shall be accomplished at each meeting:

- Review of previous meeting minutes
- Review of the project schedule
  - Work or testing accomplished since the last meeting
  - Rework items identified since the last meeting
  - Rework items completed since the last meeting
- Submittal status
  - Submittals reviewed since the last meeting
  - Submittals expected within the next 2-week window
- Review of the work scheduled over the next 2-week window
  - Establish completion targets for any outstanding rework
  - Identify and schedule any DFOWs requiring preparatory phase activities
  - Identify and schedule any DFOWs requiring initial phase activities
  - Identify and schedule any DFOWs requiring follow-up phase activities
  - Identify any testing required in support of or confirming remedial activities
  - Review status of any offsite activities
  - Identify any special documentation requirements for either production or QC
  - Address and resolve any production or QC problems
- Identify any activities or items that may require revising this QCP and annotate any recommendations
- Identify any production or QC procedures that may be less effective than anticipated and may require revising the project delivery or Contingency Plan and annotate any recommendations
- Identify any safety concerns relative to any work activity



# 6.0 Reporting, Field Records, and Construction Documentation

---

Implementation of this QCP is documented and reported to the Navy CO or designated representative using a series of reports and deliverables. These deliverables, the parties responsible for preparing them, and their frequency and content are listed in Table 6-1. Examples of these forms and reports are included in Attachment A.

TABLE 6-1  
Reporting and Field Documentation Required

| <b>Report or Documentation Requirement</b> | <b>Completed By</b> | <b>Delivered To</b> | <b>Frequency</b>  | <b>Report Description</b>   |
|--|---------------------|---------------------|---|---|
| Contractor Production Report               | Site Superintendent | Navy FEAD           | Daily, for each TO – original and one copy due by 10 am next working day after each day that work is performed                    | Documents daily construction activity on each site. Specific report procedures in standard operating procedure (SOP) PM-019.  |
| CQCR                                       | Project QC Manager  | Navy FEAD           | Daily, for the preceding business day - original and one copy due by 10 am next working day after each day that work is performed | Documents the daily qc activity for each to. Includes the contractor production reports. Specific procedures in SOP PM-019.   |
| Testing Plan and Log                       | Project QC Manager  | Navy FEAD           | Monthly – due by end of each month  | Defines and records results of all onsite testing, for each to be maintained at time of testing, or when laboratory results are received. Specific details for use of the plan and log in SOP PM-026. |
| Monthly Summary of Field Tests             | Project QC Manager  | Navy FEAD           | Monthly, attached to the last CQCR submitted for each reporting period – original and one copy due at the end of each month       | Summarizes all testing activity conducted for the reporting period with test results (pass/fail) specific details for use of this report in SOP PM-010.   |
| QC Meeting Minutes                         | Project QC Manager  | Navy FEAD           | As attachment to appropriate CQCR – due within 2 calendar days of the meeting   | Minutes of any to QC meeting held. Specific preparation and content requirement in SOP PM-016.  |

TABLE 6-1  
Reporting and Field Documentation Required

| <b>Report or Documentation Requirement</b> | <b>Completed By</b>                        | <b>Delivered To</b>                          | <b>Frequency</b>  | <b>Report Description</b>   |
|--|--|--|---|---|
| Rework Items List                          | Project QC Manager                         | Navy FEAD                                    | Monthly, attached to the last CQCR submitted for each reporting period – one copy by last working day of the month  | Documents re-work items not corrected on same day as discovery. Includes items identified by both CH2M HILL and Navy CO or designated representative. Specific information on use and preparation is provided in SOP PM-004.                |
| Submittal Register                         | Project QC Manager and Site Superintendent | Navy FEAD                                    | Maintained through life of TO   | A part of each TO's Construction Quality Plan; may also be provided by Navy CO for deliverables. Specific to the construction activity for that Task Order. Specific information provided in SOP PM-018.                                    |
| As-built Records (red-line mark ups)       | Project QC Manager and Field Engineer      | Navy FEAD                                    | Maintained in field through life of each to certify complete and accurate by Project QC Manager upon completion. Included in construction completion report | Requirements specified in each TO's Construction Quality Plan; to be maintained at job site and inspected by QC personnel to ensure daily upkeep. Certificate of accuracy required from Project QC Manager, to Navy CO or COR (SOP PM-023). |
| Photographic Record                        | Site Superintendent and Field Engineer     | Navy FEAD                                    | Maintained in field through life of TO  | Photographic record showing construction progress, special situations. Specific requirements for photographic documentation, processing, storage, reference SOP PM-014 for details.   |
| Transportation and Disposal Log            | Project QC Manager                         | Navy Transportation and Disposal Coordinator | Monthly and maintained in field through life of TO  | Tracks waste on the project from generation to final disposition. Specific information on use and preparation is provided in SOP ER-003.  |

# 7.0 QC Documentation

---

## 7.1 Contractor Production Report

Contractor Production Reports (CPRs) are required for each day that work is performed and will be attached to the CQCR prepared for the same day. The CPR is the daily record of operations on the job site and must be kept current. These reports are the official record of work performance and compliance with project plans, drawings, and specifications. It is therefore critical that the reports are correct and timely.

The CPRs will account for each work day throughout the life of the contract. The reporting of work will be identified by terminology consistent with the construction schedule. CPRs will be prepared, signed, and dated by the Site Superintendent and will contain the following information:

- a) Date of report, report number, name of contractor, contract number, title, location of contract, and Site Superintendent present.
- b) Weather conditions in the morning and in the afternoon, including maximum and minimum temperatures.
- c) A list of contractor and subcontractor personnel on the work site, their trades, employer, work location, description of work performed, and hours worked.
- d) A list of job safety actions taken and safety inspections conducted. Indicate that safety requirements have been met, including the results of the following:
  - 1) Was a job safety meeting held? (if YES, attach a copy of the meeting minutes)
  - 2) Were there any lost time accidents? (if YES, attach a copy of the completed Occupational Safety and Health Administration report.)
  - 3) Was trenching, scaffold, high-voltage electrical, or high work done? (If YES, attach a statement or checklist showing inspection performed.)
  - 4) Was hazardous material or waste released into the environment? (If YES, attach description of incident and proposed action.)
- e) A list of equipment and material received each day that is incorporated into the job.
- f) A list of construction and plant equipment on the work site during the number of hours used, idle, and down for repair.
- g) A "Remarks" section containing pertinent information such as directions received, problems encountered during construction, work progress and delays, conflicts or errors in the drawings or specifications, field changes, safety hazards encountered, instruction given and corrective actions taken, delays encountered, and a record of visitors to the work site.

The CPR form provided in Attachment A will be used on this project.

## 7.2 Contractor Quality Control Report

The CQCR documents the quality activities on the project. CQCRs are required for each day that work is performed and for every 7 consecutive calendar days of no work, submitted on the last day of that no-work period. The CQCR is the daily records of QC actions performed on the job site and must be kept current. These reports are the official record of work performance and compliance with project plans, drawings, and specifications. It is therefore critical that the reports are correct and timely.

Each work day throughout the life of the contract is accounted for in the CQCR. The reporting of work will be identified by terminology consistent with the construction schedule. CQCRs are prepared, signed, and dated by the Project QC Manager and will contain the following information:

- Identify the control phase and DFOW.
- Results of the preparatory phase meetings held, including the location of the DFOW and a list of personnel present at the meeting. Verify in the report that for this DFOW, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedule have been discussed.
- Results of the initial phase meetings held, including the location of the DFOW and a list of personnel present at the meeting. Verify in the report that for this DFOW the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, test results are acceptable, work is in compliance with the contract, and the required testing has been performed. Include a list of personnel who performed the tests.
- Results of the follow-up phase inspections held, including the location of the DFOW. Verify in the report for this DFOW that the work complies with the contract as approved in the initial phase and that required testing has been performed. Include a list of personnel who performed the tests.
- Results of the three phases of control for offsite work, if applicable, including actions taken.
- List rework items identified, but not corrected by close of business.
- As rework items are corrected, provide a revised rework items list along with the corrective action taken. (Note: All rework will be non-fee bearing).
- A "Remarks" section containing pertinent information such as directions received, QC problem areas, deviations from the QCP, construction deficiencies encountered, QC meetings held, acknowledgment that as-build drawings have been updated, corrective direction given by the Project QC Manager, and corrective action taken.
- CQCR certification

The CQCR form and Preparatory Phase Report included in Attachment A will be used on this project.

## 7.3 Project Files

Documentation generated by the QC system must be maintained in an orderly fashion. It is suggested that the Project QC Manager maintains a series of 3-ring binders for ready reference. These should be arranged by category and tabbed to include the following items:

- CPR
- CQCR
- H&S Reports
- Rework items lists
- Testing plan and log
- Monthly summary of field tests
- Submittal Register
- Contract modifications and RFIs arranged in numerical order
- Correspondence
- Non-compliance notices and corrective actions
- Photos and photo logs

## 7.4 Field Documentation Operating Procedures

The objective of the field documentation operating procedures is to ensure that appropriate project information is documented in logbooks during construction. This documentation is important for communicating activities with other project team members and the Navy personnel.

QC observations, inspections, and records of general QC activities on a regular basis are as follows:

- Record daily progress and associated QA and QC sampling
- Record construction operations, sequence, staging, and so forth
- Describe deviations from expected conditions, unexpected problems, and their resolution

## 7.5 Field Logbook

The Project QC Manager will maintain a record of daily QC activities during construction in a field logbook that will be available upon request for review. Information recorded in the CPR and CQCR will be supplemented with information contained in the logbook, but the intent is not to repeat information. As an operating procedure for logbook entries, the following items will be recorded, at a minimum:

- Date, project name, and location
- Daily start time
- Summary of weather conditions

- General description of work activities, size of work crew, and the equipment and personnel onsite
- Duration of lunch break
- Start time and duration of downtime resulting from equipment breakdown or weather
- Summaries of QC meetings and actions recommended to be performed
- QC-testing equipment and personnel
- Identification of work locations
- Description of materials delivered to the site, including QC data provided by the suppliers
- Record of decisions made regarding defective work, corrective measures implemented, or both
- Field tests
- Sampling activities
- Signature or initial at the bottom of each page of the field log. Each entry should be dated in order to show that notes are being taken on a daily basis. A line-through will be placed on any portion of a logbook page that is unused. No correction fluid may be used.

The Project QC Manager will sign or initial the bottom of each page of the field log and date the entry in order to show that notes are being taken on a daily basis. A line-through will be placed on any portion of a logbook page that is unused.

# 8.0 Construction QC Submittals

---

Construction QC submittals are generated by either the Project QC Manager or the subcontractor during or immediately before construction to demonstrate compliance with the project plans. Submittal requirements shall be tabulated in the Submittal Register according to the requirements identified in the project plans.

The QC Manager will monitor submittal activities to verify:

- Submittal completeness
- Required submittal inclusion
- Submittal schedule status
- Current submittal status
- Resubmittals

The QC Manager will log and track submittals in the Submittal Register. Specific responsibilities regarding submittals are as follows:

- Coordinating submittal actions
- Maintaining necessary submittal records in an organized fashion
- Maintaining and tracking submittals in the Submittal Register
- Reviewing and certifying submittals for compliance with the project plans, drawings, and specifications
- Approving submittals except those designated to be approved by the Navy and stakeholders
- Checking material and equipment delivered to the project for compliance with the project plans, drawings, and specifications

Certain designated submittals require approval by authorities other than the QC Manager (such as the PM, technical lead and lead engineer, or other qualified persons). In such cases, the QC Manager forwards the submittal to the PM or project engineer who routes the submittal to the appropriate approver.

The Site Superintendent/Construction Manager and Project QC Manager are responsible for coordinating the submittal transmittal and approval process and for following through to ensure that the process does not adversely affect the project schedule.

## 8.1 Submittal Review and Control

AGVIQ-CH2M HILL will control and schedule submittals and will document the process in the Submittal Register. The Project QC Manager is responsible for updating the Submittal Register at least once a week and forwarding a copy of the submittal register to the PM and Program Quality Manager at the end of each month of project work. Each submittal will be

routed on a standard submittal form. Units of weights and measures used on the submittals will be consistent with those used in the project documents.

Each submittal will be reviewed for completeness and compliance with contract requirements by individuals qualified to perform the review of that specific item. The submittal reviewers and approvers will be designated before construction.

The Project QC Manager will certify that the submittal is in compliance with the project requirements. Submittals that do not comply with the requirements will be returned to the originator for correction and re-submittal. Substitutions or variations of specified requirements will be clearly noted. Certification of the approved submittals will be indicated by signing or initialing and dating the submittal form by the Project QC Manager. Submittals include the following:

- Personnel qualifications
- Product data
- Permits
- Samples
- Catalog cuts and pages
- Production, inspection, and test reports
- Material certifications
- Progress reports, safety reports, and manpower reports
- Red-line drawing and as-built or certified data
- QC records and certifications
- Sample and test results
- QC reports
- Construction photographs and photo logs
- Contract closeout documents



# 9.0 Change Control

---

Changes to final designs, final project plans, and field changes are subject to design verification measures commensurate with those applied to the draft project plans. The PM approves work plan changes in consultation with the technical lead or lead engineer.

RFIs will be used to communicate and document clarifications as well as modifications requested by the subcontractor. The RFIs will be tracked and logged by the Project QC Manager to ensure that each RFI is fully addressed and that changes to the plans, drawings, and specifications are completely and accurately documented.

## 9.1 Construction Changes

Changes to materials, supplies, work approaches, and corrective actions during construction will be documented in an overall effort to support sound engineering judgment and cost-effective project delivery. Changes during construction will be documented using the RFI process.

The RFI process involves either the subcontractor or the Project QC Manager identifying the situation in the field that requires change. When a change is identified by the subcontractor, the subcontractor reports the concern to the Project QC Manager. The Project QC Manager then prepares an internal RFI, identifying the concern, and forwards it to the PM. The PM reviews and either approves or forwards to the relevant personnel needed for approval. The RFI will contain the TO number, an RFI identification number, and a title to facilitate RFI tracking. The RFIs are numbered sequentially for individual TOs and filed at the job site with the PM and the design team. The response should include a narrative explanation of the resolution, with any drawings or specifications required to complete the work as attachments. The response is returned to the PM and forwarded to the Project QC Manager and Construction Manager for field implementation.

The RFI process is a field construction tool for documenting changed field conditions or other issues that may require a deviation from project requirements identified in the drawings and specifications. The RFI is intended to obtain input and concurrence from the lead engineer responsible for the development of the project plans. Approval of the RFI by the lead engineer does not constitute approval for AGVIQ-CH2M HILL or its subcontractors to perform work that is outside of the project scope or budget. If issues identified in the RFI may require a change to the project scope, schedule, or budget, this should be clearly conveyed in the RFI. In such instances, it is the responsibility of the PM to work closely with the Contract Administrator to seek and obtain proper approval from the Navy (according to established contractual procedures) before implementing the change recommended in the RFI.

## 10.0 Noncompliance and Corrective Actions

---

The Project QC Manager will notify the subcontractor of any detected noncompliance with the project requirements. The subcontractor will take immediate corrective action after receipt of such notice. Such notice, when delivered to the subcontractor at the work site, will be deemed sufficient notification. If the subcontractor fails or refuses to comply promptly, the Project QC Manager may issue an order stopping all or part of the work until satisfactory corrective action has been taken. Noncompliance notification or stop work orders will be documented in the Daily Report. Completion of corrective action will be noted on the CQCR. Verification of the corrective action and its results will be performed by the Project QC Manager and documented in the CQCR.

### 10.1 Corrective Measure Plan

Resolution of failing test results or noncompliance reports will be completed through a corrective measure plan. The corrective measure plan will be developed and documented by the Project QC Manager in conjunction with the PM. The agreed-upon plan will be implemented and documented by the Project QC Manager, who also will be responsible for its completion.

# Attachment A

## Project QC Forms


---

- Submittal Register
- Testing Plan and Log
- Monthly Summary Report of Field Tests
- Photo Log
- Photo Labels
- Preparatory Phase Report
- Contractor Production Report
- Contractor Quality Control Report
- Request for Information
- Request for Information Log

### Submittal Register

| Contract Number: N62470-08-D-1006                               |   | TO No.: WE23 |           |                     | TO Title: Installation of Interim Emergency Liquid Phase Granular Activated Carbon (LPGAC) Unites |                  |                           | Location: Levittown, New York |                        |                          | Contractor:            |                |                        |                              |                                 |                            |         |
|---|---|--------------|-----------|---------------------|---|------------------|---------------------------|-------------------------------|------------------------|--------------------------|------------------------|----------------|------------------------|------------------------------|---------------------------------|----------------------------|---------|
| A   |   | C            | D         | E                   | F   | G                | H                         | I                             | J                      | K                        | L                      | M              | N                      | O                            | P                               | Q                          |         |
| Spec Section  |   | Para. Number | Frequency | Approving Authority | Other Reviewers   | Submittal Number | Scheduled Submission Date | AGVIQ-CH2M Review Date        | AGVIQ-CH2M Disposition | AGVIQ-CH2M Transmit Date | QC Admin Received Date | QC Disposition | QC Admin Transmit Date | Contracting Officer Received | Contracting Officer Disposition | Contracting Officer Return | Remarks |
| <b>Scope of Work</b>  |   |              |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 01 01 00  | Markup Drawings   | 1.3          |           | Contracting Officer |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 01 01 00  | Production Information for changes or additions per the Markup                        | 1.3          |           | Contracting Officer |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| <b>Water Piping</b>   |   |              |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Product Data - water main piping  | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Product Data - fittings   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Product Data - valves   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Product Data - joints   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Product Data - valve pits   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Product Data - couplings  | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Test Results - bacteriological disinfection   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | Certificates - Shop-applies linings   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 33 11 00  | O & M / Manufacturers instruction - tools/keys/instructions for operating gate valves | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| <b>Pipelines, Process Piping</b>                                |   |              |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 05 13  | Product Data - piping systems   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 05 13  | MSDS - each chemical  | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 05 13  | Test Reports - Hydrostatic Tests  | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 05 13  | Test Reports - Pipe leakage Tests   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 05 13  | Test Reports - Valve Tests  | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 05 13  | Test Reports - Disinfection   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 05 13  | As-Built Drawings   | 1.4          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| <b>Instrumentation and Process Control</b>                      |   |              |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 40 95 00  | Product Data - Instrument and Process Controls  | 1.2          |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| <b>Liquid Phase Granular Activated Carbon Adsorption System</b> |   |              |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | Product Data - Adsorber Vessel  | 1.4.A        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | System Flow Diagram   | 1.4.B        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | System General Arrangement  | 1.4.C        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | Process Flow and Instrument Diagrams  | 1.4.D        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | System Pressure Drop Information  | 1.4.E        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | GAC Specifications  | 1.4.F        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | Manufacturer's Certificates   | 1.4.G        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | Specifications - pipe, fittings and instrumentation                                   | 1.4.H        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | Specifications - vessel lining  | 1.4.H.1      |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | Specifications - vessel painting  | 1.4.H.2      |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |
| 43 31 13  | System O & M Manual   | 1.4.I        |           |                     |   |                  |                           |                               |                        |                          |                        |                |                        |                              |                                 |                            |         |

## TAB A Testing Plan and Log

| <br>SMALL BUSINESS RAC |               | TO No.: WE23 | TO Title: Installation of Intermim Emergency Liquid Phase Granular Activaged Carbon (LPGAC) Units |           |               |           |                | Location: Levittown, New York |                        |         |  |
|---|---------------|--------------|---|-----------|---------------|-----------|----------------|-------------------------------|------------------------|---------|--|
| A   | B             | C            | D   | E         | F             | G         | H              | I                             | J                      | K       |  |
| Spec Section and Paragraph  | Test Required | Proposed Lab | Sampled By  | Tested By | Test Location | Frequency | Date Test Made | Test Results                  | Date Results Forwarded | Remarks |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |
|   |               |              |   |           |               |           |                |                               |                        |         |  |



**TAB B**


**Monthly Summary Report of Field Tests**

|   |                         |   |   |
|---|-------------------------|---|---|
| <b>Start Date:</b>                          | <b>End Date:</b>        | <b>Submittal Date:</b>  | <b>Submitted By:</b>                    |
| <b>Contract Number:</b><br>N62470-08-D-1006 | <b>CTO No.:</b><br>WE23 | <b>CTO Title:</b><br>Installation of Interim<br>Emergency Liquid<br>Phase Granular<br>Activated Carbon<br>(LPGAC) Units | <b>Location:</b><br>Levittown, New York |
| <b>Type of Test Required</b>                | <b>Date of Test</b>     | <b>Reporting Laboratory</b>   | <b>Test Results</b>                     |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |
|   |                         |   |   |







|  |  |                                     |  |                |  |
|--|--|-------------------------------------|--|----------------|--|
| <b>SMALL BUSINESS RAC</b><br> |  | <b>PREPARATORY PHASE<br/>REPORT</b> |  | REPORT NO:     | REPORT DATE:<br>REVISION NO:<br>REVISION DATE: |
| PROJECT NO: 420233   |  | DEFINABLE FEATURE OF WORK:          |  | SITE/ACTIVITY: |  |
| <b>PERSONNEL PRESENT</b>   | _____  |                                     |  |                |  |
|  | NAME   | POSITION                            | COMPANY/GOVERNMENT   |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
| <b>SUBMITTALS</b>  | REVIEW SUBMITTALS AND/OR SUBMITTAL REGISTER.   |                                     | HAVE ALL SUBMITTALS BEEN APPROVED?    YES <input type="checkbox"/> NO <input type="checkbox"/> |                |  |
|  | IF NO, WHAT ITEMS HAVE NOT BEEN SUBMITTED?   |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  | ARE ALL MATERIALS ON HAND?    YES <input type="checkbox"/> NO <input type="checkbox"/>     |                                     |  |                |  |
|  | IF NO, WHAT ITEMS ARE MISSING?   |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
| CHECK APPROVED SUBMITTALS AGAINST DELIVERED MATERIAL. (THIS SHOULD BE DONE AS MATERIAL ARRIVES).<br>COMMENTS:  |  |                                     |  |                |  |
| <b>MATERIAL STORAGE</b>  | ARE MATERIALS STORED PROPERLY?    YES <input type="checkbox"/> NO <input type="checkbox"/> |                                     |  |                |  |
|  | IF NO, WHAT ACTION IS TAKEN?   |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
| <b>SPECIFICATIONS</b>  | REVIEW EACH PARAGRAPH OF SPECIFICATIONS.   |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  | DISCUSS PROCEDURE FOR ACCOMPLISHING THE WORK.  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  | CLARIFY ANY DIFFERENCES.   |                                     |  |                |  |
| <b>PRELIM WORK &amp; PERMITS</b>   | ENSURE PRELIMINARY WORK IS CORRECT AND PERMITS ARE ON FILE.                                |                                     |  |                |  |
|  | IF NO, WHAT ACTION IS TAKEN?   |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |
|  |  |                                     |  |                |  |

|                               |   |                                 |  |                |                                |
|-------------------------------|---|---------------------------------|--|----------------|--------------------------------|
| <b>CH2M HILL</b><br>RAC 4     |   | <b>PREPARATORY PHASE REPORT</b> |  | REPORT NO:     | REPORT DATE:                   |
| PROJECT NO: 420233            |   | DEFINABLE FEATURE OF WORK:      |  | SITE/ACTIVITY: | REVISION NO:<br>REVISION DATE: |
| <b>TESTING</b>                | IDENTIFY TEST TO BE PERFORMED, FREQUENCY, AND BY WHOM.                                      |                                 |  |                |                                |
|                               | TEST  | FREQUENCY                       |  | PERFORMER      |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               | WHEN REQUIRED?  |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               | WHERE REQUIRED?   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               | REVIEW TESTING PLAN.  |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               | HAVE TEST FACILITIES BEEN APPROVED?   |                                 |  |                |                                |
|                               | TEST FACILITY   |                                 |  | APPROVED?      |                                |
|                               |   |                                 | YES <input type="checkbox"/> NO <input type="checkbox"/> |                |                                |
|                               |   |                                 | YES <input type="checkbox"/> NO <input type="checkbox"/> |                |                                |
| <b>SAFETY</b>                 | ACTIVITY HAZARD ANALYSIS APPROVED? YES <input type="checkbox"/> NO <input type="checkbox"/> |                                 |  |                |                                |
|                               | REVIEW APPLICABLE PORTION OF EM 385-1-1 AND AHA.  |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
| <b>MEETING COMMENTS</b>       | NAVY/ROICC COMMENTS DURING MEETING.   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
| <b>OTHER ITEMS OR REMARKS</b> | OTHER ITEMS OR REMARKS:   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
|                               |   |                                 |  |                |                                |
| QC REPRESENTATIVE'S NAME      |   | QC REPRESENTATIVE'S SIGNATURE   |  | DATE           |                                |



# CONTRACTOR PRODUCTION REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE OF REPORT:

REVISION NO:

REVISION DATE:

|                    |                        |                              |
|--------------------|------------------------|------------------------------|
| CTO NO: WE23       | PROJECT NAME/LOCATION: | REPORT NO:                   |
| PROJECT NO: 420233 | SUPERINTENDENT:        | SITE H&S SPECIALIST:         |
| AM WEATHER:        | PM WEATHER:            | MAX TEMP: F      MIN TEMP: F |

|   |   |   |   |
|---|---|---|---|
| <div style="border: 2px solid black; border-radius: 50%; padding: 10px; width: 80px; margin: 0 auto;"> <b>JOB<br/>SAFETY</b> </div> | Was A Job Safety Meeting Held This Date? <input type="checkbox"/> Yes <input type="checkbox"/> No   |   | including Continuation Sheets)                      |
|   | Were there any lost-time accidents this date? (If Yes, attach copy of completed OSHA report) <input type="checkbox"/> Yes <input type="checkbox"/> No   |   | CH2MHILL On-Site Hours                              |
|   | Was a Confined Space Entry Permit Administered This Date? (If Yes, attach copy of each permit) <input type="checkbox"/> Yes <input type="checkbox"/> No   |   | AGVIQ On-Site Hours                                 |
|   | Was Crane/Manlift/Trenching/Scaffold/HV Elec/High Work/Hazmat Work Done?? (If Yes, attach statement or checklist showing inspection performed) <input type="checkbox"/> Yes <input type="checkbox"/> No |   | Subcontractor On-Site Hours                         |
|   | Was Hazardous Material/Waste Released into the Environment? (If Yes, attach description of incident and proposed action) <input type="checkbox"/> Yes <input type="checkbox"/> No                       |   | Cumulative Total of Work Hours From Previous Report |
|   |   | Total Work Hours From Start of Construction |   |

**SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED** (Include Safety Violations, Corrective Instructions Given, Corrective Actions Taken, and Results of Safety Inspections Conducted):

| EQUIPMENT/MATERIAL RECEIVED TODAY TO BE INCORPORATED IN JOB |                           |                       |                         |                        |
|---|---------------------------|-----------------------|-------------------------|------------------------|
| DESCRIPTION OF EQUIPMENT/MATERIAL RECEIVED                  | MAKE/ MODEL/ MANUFACTURER | EQUIPMENT/ LOT NUMBER | INSPECTION PERFORMED BY | NUMBER/ VOLUME/ WEIGHT |
|   |                           |                       |                         |                        |
|   |                           |                       |                         |                        |
|   |                           |                       |                         |                        |
|   |                           |                       |                         |                        |
|   |                           |                       |                         |                        |

| EQUIPMENT USED ON JOB SITE TODAY. |                      |                           |                 |      |        |
|-----------------------------------|----------------------|---------------------------|-----------------|------|--------|
| EQUIPMENT DESCRIPTION             | EQUIPMENT MAKE/MODEL | SAFETY CHECK PERFORMED BY | NUMBER OF HOURS |      |        |
|                                   |                      |                           | USED            | IDLE | REPAIR |
|                                   |                      |                           |                 |      |        |
|                                   |                      |                           |                 |      |        |
|                                   |                      |                           |                 |      |        |
|                                   |                      |                           |                 |      |        |

**CHANGED CONDITIONS/DELAY/CONFLICTS ENCOUNTERED** (List any conflicts with the delivery order [i.e., scope of work and/or drawings], delays to the project attributable to site and weather conditions, etc.):

**VISITORS TO THE SITE:**

**LIST OF ATTACHMENTS** (OSHA report, confined space entry permit, incident reports, etc.):

SAFETY REQUIREMENTS HAVE BEEN MET

SUPERINTENDENT'S SIGNATURE

DATE

| <b>AGVIQ-CH2M HILL</b><br>■<br>■  |                | <b>CONTRACTOR PRODUCTION REPORT</b><br>(ATTACH ADDITIONAL SHEETS IF NECESSARY) |         |                      | DATE OF REPORT:<br>REVISION NO:<br>REVISION DATE: |     |
|---|----------------|--|---------|----------------------|---|-----|
| CTO NO: WE23  |                | PROJECT NAME/LOCATION:   |         |                      | REPORT NO:  |     |
| PROJECT NO: 420233  |                | SUPERINTENDENT:<br><br>■   |         | SITE H&S SPECIALIST: |   |     |
| EMPLOYEE  | WORK PERFORMED | EMPLOYER   | FEMALE? | MINORITY?            | TITLE/TRADE                                       | HRS |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
|   |                |  |         |                      |   |     |
| <i>INCLUDE ALL PERSONNEL WORK HOURS IN THE TOTAL WORK HOURS ON JOB SITE</i> |                |  |         |                      |   |     |
| SAFETY REQUIREMENTS HAVE BEEN MET <input type="checkbox"/>                  |                |  |         |                      |   |     |
| _____   |                |  |         |                      | _____   |     |
| SUPERINTENDENT'S SIGNATURE  |                |  |         |                      | DATE  |     |



**Small Business RAC**  
**N62470-08-D-1006**

## CONTRACTOR QUALITY CONTROL REPORT

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

REPORT DATE:  
REVISION NO:  
REVISION DATE:

|                    |                        |                      |
|--------------------|------------------------|----------------------|
| CTO NO: WE23       | PROJECT NAME/LOCATION: | REPORT NO:           |
| PROJECT NO: 420233 | PROJECT QC MANAGER:    | SITE H&S SPECIALIST: |

**SAFETY MEETINGS AND INSPECTIONS**

|                                      |                              |                             |  |
|--------------------------------------|------------------------------|-----------------------------|--|
| WAS A SAFETY MEETING HELD THIS DAY?  | <input type="checkbox"/> YES | <input type="checkbox"/> NO | IF YES, ATTACH SAFETY MEETING MINUTES  |
| WAS CRANE USED ON THE SITE THIS DAY? | <input type="checkbox"/> YES | <input type="checkbox"/> NO | IF YES, ATTACH DAILY CRANE REPORT OF INSPECTION AND CONTRACTOR CRANE OPERATION CHECKLIST |

**DEFINABLE FEATURES OF WORK STATUS**

| DFOW No. | Definable Feature Of Work | Preparatory              | Initial                  | Follow-Up                |
|----------|---------------------------|--------------------------|--------------------------|--------------------------|
| 1        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9        |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10       |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 11       |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 12       |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 13       |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 14       |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15       |                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

**PREPARATORY** WAS PREPARATORY PHASE WORK PERFORMED TODAY?  YES  NO  
IF YES, FILL OUT AND ATTACH SUPPLEMENTAL PREPARATORY PHASE CHECKLIST.

| DFOW No.(from list above). | TASK/ACTIVITY | PREPARATORY PHASE REPORT NO. |
|----------------------------|---------------|------------------------------|
|                            |               |                              |
|                            |               |                              |
|                            |               |                              |
|                            |               |                              |
|                            |               |                              |
|                            |               |                              |

**INITIAL AND FOLLOW-UP FEATURE OF WORK COMMENTS**

| DFOW No.(from list above) | Phase                              | Comment/Finding/Action |
|---------------------------|------------------------------------|------------------------|
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |
|                           | Initial <input type="checkbox"/>   |                        |
|                           | Follow up <input type="checkbox"/> |                        |

|   |  |
|---|--|
| <b>REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)</b> | <b>REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)</b> |
|---|--|

| TASK/ACTIVITY | DATE ISSUED | DESCRIPTION | TASK/ACTIVITY | CORRECTIVE ACTION(S) TAKEN |
|---------------|-------------|-------------|---------------|----------------------------|
|               |             |             |               |                            |
|               |             |             |               |                            |
|               |             |             |               |                            |


|  |                       |   |  |  |  |
|--|-----------------------|---|--|--|--|
| <b>AGVIQ-CH2M HILL</b><br>Small Business RAC<br>N62470-08-D-1006   |                       | <b>CONTRACTOR QUALITY CONTROL REPORT</b><br>(ATTACH ADDITIONAL SHEETS IF NECESSARY) |  |  | REPORT DATE:<br>REVISION NO:<br>REVISION DATE:     |
| CTO NO: WE23   |                       | PROJECT NAME/LOCATION:  |  |  | REPORT NO:   |
| PROJECT NO: 420233   |                       | PROJECT QC MANAGER:   |  | SITE H&S SPECIALIST:                                     |  |
| <b>SAMPLING/TESTING PERFORMED</b>  |                       |   |  |  |  |
| SAMPLING/TESTING PERFORMED   |                       | SAMPLING/TESTING COMPANY  |  | SAMPLING/TESTING PERSONNEL                               |  |
|  |                       |   |  |  |  |
|  |                       |   |  |  |  |
|  |                       |   |  |  |  |
|  |                       |   |  |  |  |
| <b>MATERIALS/EQUIPMENT INSPECTION (Materials received and inspected against specifications)</b>  |                       |   |  |  |  |
| MATERIAL/EQUIPMENT DESCRIPTION   |                       | SPECIFICATION   | MATERIAL ACCEPTED?                                       |  | COMMENT/REASON/ACTION                              |
|  |                       |   | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |  |
|  |                       |   | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |  |
|  |                       |   | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |  |
|  |                       |   | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |  |
|  |                       |   | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |  |
|  |                       |   | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |  |
| <b>SUBMITTALS INSPECTION / REVIEW</b>  |                       |   |  |  |  |
| SUBMITTAL NO   | SUBMITTAL DESCRIPTION |   | SPEC/PLAN REFERENCE                                      | SUBMITTAL APPROVED?                                      | COMMENT/REASON/ACTION                              |
|  |                       |   |  | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |
|  |                       |   |  | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |
|  |                       |   |  | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |
|  |                       |   |  | YES <input type="checkbox"/> NO <input type="checkbox"/> |  |
| <b>OFF-SITE SURVEILLANCE ACTIVITIES, INCLUDING ACTIONS TAKEN:</b>  |                       |   |  |  |  |
| <b>ACCUMULATION/STOCKPILE AREA INSPECTION</b>  |                       |   |  |  |  |
| INSPECTION PERFORMED BY:   |                       | SIGNATURE OF INSPECTOR:   |  |  |  |
| ACCUMULATION/ STOCKPILE AREA LOCATION  |                       |   |  |  |  |
| NO OF CONTAINERS:  | NO OF TANKS:          | NO OF ROLL-OFF BOXES:   |  | NO OF DRUMS:   |  |
| INSPECTION RESULTS:  |                       |   |  |  |  |
| TRANSPORTATION AND DISPOSAL ACTIVITIES/SUMMARY/QUANTITIES:   |                       |   |  |  |  |
| GENERAL COMMENTS (rework, directives, etc.):   |                       |   |  |  |  |
| LIST OF ATTACHMENTS (examples, as applicable: preparatory phase checklist, QC meeting minutes, safety meeting minutes, crane inspections, crane operation checklist, COCs, weight tickets, manifests, profiles, rework item list, testing plan and log, etc.):   |                       |   |  |  |  |
| <p><i>On behalf of the contractor, I certify that this report is complete and correct and equipment and material used and work performed during this reporting period is in compliance with the contract drawings and specifications to the best of my knowledge except as noted in this report.</i></p> |                       |   |  |  | <p>_____</p> <p>PROJECT QC MANAGER'S SIGNATURE</p> |
|  |                       |   |  |  | <p>_____</p> <p>DATE</p>                           |
| <p><i>On behalf of the contractor, I attest that the work for which payment is requested, including stored material, is in compliance with contract requirements.</i></p>  |                       |   |  |  | <p>_____</p> <p>PROJECT QC MANAGER'S SIGNATURE</p> |
|  |                       |   |  |  | <p>_____</p> <p>DATE</p>                           |



**REQUEST FOR INFORMATION**

|  |  |   |  |
|--|--|---|--|
| Project Name/Description:  |  | RFI No.:                                    | Date Submitted:                        |
| Contract/TO No: WE23   |  | Project No:                                 | 420233                                 |
| <b>To:</b>   |  | Name  | Title                                  |
| <b>From:</b>   |  | Name  | Title                                  |
| <b>REFERENCES</b>  |  |   |  |
| Document ( <i>Work Plan, Scope of Work, etc.</i> ):  |  |   |  |
| Drawing(s)/Specification ( <i>Drawing No, Specification No., etc.</i> ):   |  |   |  |
| Detail/Section ( <i>Page No., Section No., Paragraph No., etc.</i> ):  |  |   |  |
| Discipline ( <i>Architecture, Electrical, Mechanical, Chemical, Hydrogeology, etc.</i> ):                        |  |   |  |
| <b>POTENTIAL IMPACT:</b> Cost <input type="checkbox"/> Schedule <input type="checkbox"/> Activity/Task Impacted: |  |   |  |
| <b>REQUEST</b>   |  |   |  |
| Requested By:<br><i>(Name/Company/Title)</i>   |  | Response Requested by Date:                 |  |
| <b>REPLY:</b>  |  |   |  |
| Responded By:<br><i>(Name/Company/Title)</i>   |  | Date of Response:                           |  |
| <b>RESPONSE DISPOSITION/ CONCURRENCE:</b>  |  |   |  |
| Response Dispositioned / Concurred With By: <i>(Name/Company/Title)</i>  |  | Date Response Dispositioned Concurred With: |  |
| <b>FURTHER ACTIONS REQUIRED:</b>   |  |   |  |
| <b>REVIEW DISTRIBUTION</b>   |  | <b>FINAL DISTRIBUTION</b>                   |  |
| <input type="checkbox"/> CH2M HILL PM  | <input type="checkbox"/>               | <input type="checkbox"/> CH2M HILL PM       | <input type="checkbox"/>               |
| <input type="checkbox"/> CH2M HILL CM  | <input type="checkbox"/>               | <input type="checkbox"/> CH2M HILL CM       | <input type="checkbox"/>               |
| <input type="checkbox"/> CH2M HILL QC  | <input type="checkbox"/> Project Files | <input type="checkbox"/> CH2M HILL QC       | <input type="checkbox"/> Project Files |

## Request For Information Log

|  |                      | Project Name:          |      |             |      | Project Number:      |        | 420233  |  |
|---|----------------------|------------------------|------|-------------|------|----------------------|--------|---------|--|
|   |                      | Field Quality Manager: |      |             |      |                      |        |         |  |
| RFI #   | Description of Issue | Submitted To           | Date | Returned To | Date | Response/Disposition | Status | Comment |  |
| 1   |                      |                        |      |             |      |                      |        |         |  |
| 2   |                      |                        |      |             |      |                      |        |         |  |
| 3   |                      |                        |      |             |      |                      |        |         |  |
| 4   |                      |                        |      |             |      |                      |        |         |  |
| 5   |                      |                        |      |             |      |                      |        |         |  |
| 6   |                      |                        |      |             |      |                      |        |         |  |
| 7   |                      |                        |      |             |      |                      |        |         |  |
| 8   |                      |                        |      |             |      |                      |        |         |  |
| 9   |                      |                        |      |             |      |                      |        |         |  |
| 10  |                      |                        |      |             |      |                      |        |         |  |
| 11  |                      |                        |      |             |      |                      |        |         |  |
| 12  |                      |                        |      |             |      |                      |        |         |  |
| 13  |                      |                        |      |             |      |                      |        |         |  |
| 14  |                      |                        |      |             |      |                      |        |         |  |
| 15  |                      |                        |      |             |      |                      |        |         |  |
| 16  |                      |                        |      |             |      |                      |        |         |  |
| 17  |                      |                        |      |             |      |                      |        |         |  |
| 18  |                      |                        |      |             |      |                      |        |         |  |
| 19  |                      |                        |      |             |      |                      |        |         |  |
| 20  |                      |                        |      |             |      |                      |        |         |  |
| 21  |                      |                        |      |             |      |                      |        |         |  |
| 22  |                      |                        |      |             |      |                      |        |         |  |
| 23  |                      |                        |      |             |      |                      |        |         |  |



APPENDIX C

# Tetra Tech NUS, Inc. Interim LPGAC System Design Specifications

---

**TECHNICAL SPECIFICATIONS**

FOR

**INTERIM EMERGENCY WELLHEAD TREATMENT  
AQUA NEW YORK WATER TREATMENT FACILITY**

SEAMANS NECK ROAD  
NASSAU COUNTY, NEW YORK

FOR

NAVAL FACILITIES ENGINEERING COMMAND,  
MID-ATLANTIC

PREPARED BY:

Tetra Tech NUS, Inc.

January 2012



## CONTENTS

### Section

|          |   |
|----------|---|
| 01 01 00 | SCOPE OF WORK   |
| 03 30 00 | CAST IN PLACE CONCRETE                                      |
| 33 11 00 | WATER PIPING  |
| 40 05 13 | PIPELINES, PROCESS PIPING                                   |
| 40 95 00 | INSTRUMENTATION AND PROCESS CONTROL                         |
| 43 31 13 | LIQUID PHASE GRANULAR ACTIVATED CARBON<br>ADSORPTION SYSTEM |

## SECTION 01 01 00

### SCOPE OF WORK

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK

- A. The Contractor shall provide all services and materials necessary for the installation of the **“Installation Of Interim Emergency GAC Units at Aqua New York Seamans Neck Road Water Plant”**, located at **670 Seaman’s Neck Road, Levittown, NY 11783** as shown on the Technical Drawings.
- B. A Scope of Work is provided as **Attachment A of this Section**, and is provided to create a uniform Schedule of Values and Measurement of Payment. The Scope is broken down into the following structure:

##### **Part A: General Scope of Work**

Section 1: Mobilization and Demobilization  
Section 2: Site Work  
Section 3: Process Treatment Systems  
Section 4: Restoration

- C. The work shall be complete and includes furnishing, as applicable or required, all Contractor’s safety devices, labor, tool, materials, supplies, and services; and performing all operations necessary for or incidental to a complete project in conformance with the attached Technical Drawings and Specifications.
- D. The Contractor shall furnish all labor, materials, equipment and incidentals to install the above listed systems and equipment, including the piping and instrumentation between all specified components and auxiliary equipment.
- E. Contractor shall be responsible for the installation of all equipment, valves, piping and any required installation.
- F. Contractor will provide one (1) year warranty for parts and workmanship, or as specified in the individual part warranties, whichever is greater.

##### 1.2 REFERENCE SPECIFICATIONS

This section refers to all technical specification divisions.

##### 1.3 SUBMITTALS

The Contractor shall submit the following to the Contracting Officer for review, comment, and approval prior to pre-construction conference.

- A. Contractor’s markup drawings.
- B. Product information for any proposed additions or changes per the Contractors markup drawings showing all important details, layout of components, materials of construction and dimensions.

#### **1.4 OPERATING INSTRUCTIONS**

- A. Operations and Maintenance is not part of the Contractor's Scope of Work. Updating the O&M manual is also not part of the Contractor's Scope of Work. The Contractor shall turn over the manufacturer's operating and maintenance instructions that typically accompany equipment to the Contracting Officer.

#### **1.5 TOOLS, SPARE PARTS, AND CONSUMABLES**

All special tools, spare parts, and consumables required for normal operation and maintenance shall be furnished in accordance with individual specifications.

#### **1.6 EQUAL PRODUCTS**

The Technical Drawings and Technical Specifications are based on a conceptual arrangement of equipment and piping. Should the Contractor propose to furnish equal equipment of a different configuration, the Contractor shall be responsible for all additions and modifications, as approved by the Contracting Officer, necessary to incorporate the proposed equipment into the design and submit all of the affected and revised Technical Drawings and Technical Specifications for review and approval by the Contracting Officer prior to their implementation.

### **PART 2 – PRODUCTS**

The Contractor shall ensure that the individual components, piping, valves, and instrumentation interfaces are strategically located such that the complete interim emergency groundwater treatment system incorporates straight runs of minimum distance, to the extent possible. In addition, the Contractor shall ensure that the components and auxiliary equipment fit within the allotted space shown on the Technical Drawings. The Contractor placement of individual units shall allow for adequate access to components within each unit, including instrumentation and valves, to allow for easy maintenance or replacement as may be required.

### **PART 3 – EXECUTION**

#### **3.1 DELIVERY AND STORAGE OF EQUIPMENT**

- A. No shipment shall be made until shop drawings have been submitted to and approved in writing by the Contracting Officer.
- B. All units shall be preassembled to the largest extent possible, compatible with transportation limitations and equipment protection considerations. Units shall be shipped complete, to the extent possible. Where absolutely necessary, some piping may be match-marked and broken down in a minimum number of pieces for field assembly by the Contractor. Pressure gauges, local instruments and primary elements, etc., may be removed for protective shipment and shall be installed in field by the Contractor.
- C. Piping or other fittings shall not be used for lifting.

#### **3.2 INSTALLATION**

Installation of units and auxiliary equipment shall be in accordance with the Suppliers and/or Manufacturers' instructions and recommendations, and as shown on the Technical Drawings and approved Contractor markups.

### **3.3 INTEGRITY INSPECTION AND FIELD TESTING**

- A. The Contractor shall perform integrity testing of the new systems, shall be present for initial startup, and shall be present when the new systems are taken on-line with the existing system.
- B. Field inspections and tests may be conducted periodically by the Contractor during installation. Integrity inspection and field testing shall be performed by the Contractor when the installations of the entire systems are complete and ready for testing.
- C. The Contractor shall hydrostatically test the entire treatment/process system by filling it with potable water.
- D. After testing, the treatment system shall be taken on-line with the existing system by the Contracting Officer, with the Contractor present at system startup.
- E. Should any part of the temporary GAC systems fail to perform in accordance with these specifications, the Contractor shall, at his own expense, make such modifications as necessary to provide satisfactory performance of the new system. If retest still fails to demonstrate conformance with the specifications, the Contracting Officer may elect to require a replacement, a modification, a cost deduction, or a combination of the above.

## SECTION 01 01 00

### ATTACHMENT "A" – SCOPE OF WORK

#### PART A – GENERAL SCOPE OF WORK

##### Section 1: Mobilization and Demobilization

Mobilization and Demobilization consists of the following construction components:

1. Provide, Execute, and Close-out the Contractor Work Plan
2. Execute the Health and Safety Plan including quality control, spill control, health and safety, traffic control, and site security.
3. Provide permits, bonds, warranties, fees, insurance, and other similar expenses required by the contract.
4. Mobilization and Demobilization of all equipment, tools, materials, supplies, temporary facilities and utilities, and personnel required to perform the work.
5. Compliance with all regulatory requirements.
6. Pre-construction and construction period planning, management, scheduling, submittals, reporting, project closeout, administration and documentation.
7. Close out the project per the Contractor Work Plan and Health and Safety Plan
8. All other requirements and miscellaneous items not included in other pay items.

##### Section 2: Site Preparation

Site Preparation and Temporary Facilities consist of the following construction components:

1. Stake-out limits of construction locations and other important features such as water main centerlines, and temporary concrete pad corners.
2. Post safety signs, temporary security fencing, tree protection fencing, flagging, and other access restrictions.
3. Coordinate temporary and relocated utilities to keep the existing treatment plant functional, and remove/cap utilities as needed to perform the Contract.
4. Clear the temporary pad area as shown on the Technical Drawings.
5. Install concrete pad (slab on grade) as shown in the technical drawings. The concrete pad will be 10-inch thick. The slab on grade shall be provided with #6 bars at 8-inch on center each way at the bottom of the slab and #6 bar at 16-inch on center each way at the top of the slab. The rebar yield strength yield strength (Fy) shall be 60 ksi. See additional details below:

| Location                       | f'c<br>(Min. 28-<br>Day Comp.<br>Strength)<br>(psi) | ASTM C 33/C 33M<br>Maximum<br>Nominal<br>Aggregate<br>(Size No.) | Range<br>of<br>Slump<br>(inches) | Maximum<br>Water-<br>Cement<br>Ratio<br>(by weight) | Air<br>Entr.<br>(percent) |
|--------------------------------|---|--|----------------------------------|---|---------------------------|
| Concrete Exposed<br>to Weather | 4500  | 57   | 4+/- 1                           | 0.50  | 6                         |

6. Unload and install activated carbon units, piping, and accessories prior to making connection to the existing system.
7. Prepare a stable base and install the temporary used backwash tank (20,000 gallon) for draining the tanks.
8. Perform trenching for installation of piping and valves as shown in the technical drawings. Coordination will also be required with Aqua NY for water main tie-in.

**Section 3: Process, Treatment, and Instrumentation Systems**

Process, Treatment, and Instrumentation Systems consists of the following components:

1. Furnish a liquid-phase granular activated carbon system (LPGAC) as shown in the technical drawings and as described in the design report and technical specifications
2. Furnish all piping, valves, monitoring equipment (flow and pressure), and appurtenances (pipe supports, etc) for the interim emergency LPGAC systems to function.
3. Install 20,000 gallons temporary storage tank for collection of used backwash water.
4. Conduct startup, testing, and if required conduct LPGAC backwashing.

**Section 4: Site Work and Restoration**

The Site Work and Restoration consist of the following components:

1. Disposal of used activated carbon shall be coordinated with the contracting officer.
2. Coordinate taking the temporary GAC units off-line with Aqua NY.
3. Dismantle and remove activated carbon unites. Demolish and remove temporary equipment pad.
4. Furnish all topsoil and seeding.



5. Repair or replace asphalt, concrete (including curb), fence, grass, trees, decorative planting, or other permanent site features that were disrupted during construction to visual acceptance or otherwise working condition.

END OF SECTION

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

**11/10**

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.

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       |
| AASHTO M 322M/M 322 | (2010) Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement |

AMERICAN CONCRETE INSTITUTE INTERNATIONAL (ACI)

- |           |   |
|-----------|---|
| ACI/MCP-1 | (2011) Manual of Concrete Practice Part 1 |
| ACI/MCP-2 | (2011) Manual of Concrete Practice Part 2 |
| ACI/MCP-3 | (2011) Manual of Concrete Practice Part 3 |
| ACI/MCP-4 | (2011) Manual of Concrete Practice Part 4 |

AMERICAN HARDBOARD ASSOCIATION (AHA)

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

ASTM INTERNATIONAL (ASTM)

- |                     |  |
|---------------------|--|
| ASTM A615/A615M     | (2009b) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement |
| ASTM A82/A82M       | (2007) Standard Specification for Steel Wire, Plain, for Concrete Reinforcement                    |
| ASTM C 1017/C 1017M | (2007) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete        |
| ASTM C 1107/C 1107M | (2011) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)                 |
| ASTM C 1116/C 1116M | (2010a) Standard Specification for Fiber-Reinforced Concrete                                       |

|                   |   |
|-------------------|---|
| ASTM C 143/C 143M | (2010) Standard Test Method for Slump of Hydraulic-Cement Concrete  |
| ASTM C 150/C 150M | (2011) Standard Specification for Portland Cement   |
| ASTM C 156        | (2009a) Standard Test Method for Water Retention by Concrete Curing Materials                                       |
| ASTM C 171        | (2007) Standard Specification for Sheet Materials for Curing Concrete   |
| ASTM C 173/C 173M | (2010b) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method                     |
| ASTM C 192/C 192M | (2007) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory                            |
| ASTM C 295        | (2008) Petrographic Examination of Aggregates for Concrete  |
| ASTM C 309        | (2007) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete                             |
| ASTM C 31/C 31M   | (2010) Standard Practice for Making and Curing Concrete Test Specimens in the Field                                 |
| ASTM C 311        | (2011) Sampling and Testing Fly Ash or Natural Pozzolans for Use as a Mineral Admixture in Portland-Cement Concrete |
| ASTM C 33/C 33M   | (2011) Standard Specification for Concrete Aggregates   |
| ASTM C 39/C 39M   | (2010) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens                              |
| ASTM C 42/C 42M   | (2010a) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete                    |
| ASTM C 494/C 494M | (2010a) Standard Specification for Chemical Admixtures for Concrete   |
| ASTM C 618        | (2008a) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete            |
| ASTM C 920        | (2011) Standard Specification for Elastomeric Joint Sealants  |
| ASTM C 94/C 94M   | (2011) Standard Specification for Ready-Mixed Concrete  |

|                 |  |
|-----------------|--|
| ASTM C 989      | (2010) Standard Specification for Slag Cement for Use in Concrete and Mortars  |
| ASTM C172/C172M | (2010) Standard Practice for Sampling Freshly Mixed Concrete   |
| ASTM C231/C231M | (2010) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method   |
| ASTM C233/C233M | (2010a) Standard Test Method for Air-Entraining Admixtures for Concrete  |
| ASTM C260/C260M | (2010a) Standard Specification for Air-Entraining Admixtures for Concrete  |
| ASTM D 1557     | (2009) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft <sup>3</sup> ) (2700 kN-m/m <sup>3</sup> )        |
| ASTM D 1751     | (2004; R 2008) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types) |
| ASTM D 1752     | (2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion   |
| ASTM D 5759     | (1995; R 2005) Characterization of Coal Fly Ash and Clean Coal Combustion Fly Ash for Potential Uses   |
| ASTM D 6690     | (2007) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements  |
| ASTM E 1745     | (2009) Standard Specification for Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs  |
| ASTM E 329      | (2011) Standard Specification for Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction  |

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

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

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

|           |   |
|-----------|---|
| NIST PS 1 | (2007) DOC Voluntary Product Standard PS 1-07, Structural Plywood |
|-----------|---|

U.S. DEPARTMENT OF COMMERCE (DOC)

## 1.2 DEFINITIONS

- a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash, ground granulated blast-furnace slag, and silica fume.
- b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.
- c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.
- d. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

## 1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

## SD-02 Shop Drawings

Fabrication Drawings for concrete formwork must be submitted by the Contractor in accordance with paragraph entitled, "Shop Drawings," of this section, to include the following:

Reinforcing steel; G

Reproductions of contract drawings are unacceptable.

Provide erection drawings for concrete that show placement of reinforcement and accessories, with reference to the contract drawings.

## SD-03 Product Data

Materials for curing concrete  
Joint sealants

Submit manufacturer's product data, indicating VOC content. Manufacturer's catalog data for the following items must include printed instructions for admixtures, bonding agents, epoxy-resin adhesive binders, waterstops, and liquid chemical floor hardeners.]

Joint filler

Cement  
Portland Cement  
Ready-Mix Concrete  
Vapor barrier

Concrete Curing Materials  
Reinforcement  
Reinforcement Materials

Synthetic reinforcing fibers

SD-05 Design Data

Concrete mix design; G

Thirty days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, fly ash, pozzolans, , ground slag polypropylene fibers, and admixtures; and applicable reference specifications. Provide mix proportion data using at least three different water-cement ratios for each type of mixture, which produce a range of strength encompassing those required for each class and type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the Contracting Officer. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Submit additional data regarding concrete aggregates if the source of aggregate changes. Submit copies of the fly ash, , polypropylene fibers and pozzolan test results, in addition. The approval of fly ash, , and pozzolan , and polypropylene fibers test results must be within 6 months of submittal date. Obtain acknowledgement of receipt prior to concrete placement.

SD-06 Test Reports

Concrete mix design; G

Fly ash

Pozzolan

Ground granulated blast-furnace slag

Aggregates

Fiber-reinforced concrete

Compressive strength tests

Air Content

Slump

Submit mill certificates for Steel Bar according to the paragraph entitled, "Fabrication," of this section.

Provide certificates for concrete that are in accordance with the paragraph entitled, "Classification and Quality of Concrete," of this section. Provide certificates that contain project name and number, date, name of Contractor, name of concrete testing service, source of concrete aggregates, material manufacturer, brand name of manufactured materials, material name, values as specified for each material, and test results. Provide certificates for Welder Qualifications that are in accordance with the paragraph entitled, "Qualifications for Welding Work," of this section.

#### 1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

Do not deliver concrete until vapor retarder, forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. ACI/MCP-2 for job site storage of materials. Protect materials from contaminants such as grease, oil, and dirt. Ensure materials can be accurately identified after bundles are broken and tags removed. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces.

##### 1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed.

#### 1.6 QUALITY ASSURANCE

##### 1.6.1 Drawings

###### 1.6.1.1 Reinforcing Steel

ACI/MCP-4. Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars.

##### 1.6.2 Control Submittals

###### 1.6.2.1 Curing Concrete Elements

Submit proposed materials and methods for curing concrete elements.

###### 1.6.2.2 Material Safety Data Sheets

Submit Material Safety Data Sheets (MSDS) for all materials that are regulated for hazardous health effects. Prominently post the MSDS at the construction site.

### 1.6.3 Test Reports

#### 1.6.3.1 Concrete Mix Design

Submit copies of laboratory test reports showing that the mix has been successfully tested to produce concrete with the properties specified and that mix must be suitable for the job conditions. Include mill test and all other test for cement, aggregates, and admixtures in the laboratory test reports. Provide maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained versus sieve size. Submit test reports along with the concrete mix design. Obtain approval before concrete placement.

#### 1.6.3.2 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C 618 for fly ash and pozzolan. Submit test results performed within 6 months of submittal date. Submit manufacturer's policy statement on fly ash use in concrete.

#### 1.6.3.3 Ground Granulated Blast-Furnace Slag

Submit test results in accordance with ASTM C 989 for ground granulated blast-furnace slag. Submit test results performed within 6 months of submittal date. Submit manufacturer's policy statement on slag use in concrete.

### 1.7 QUALIFICATIONS FOR CONCRETE TESTING SERVICE

Perform concrete testing by an approved laboratory and inspection service experienced in sampling and testing concrete. Testing agency must meet the requirements of ASTM E 329.

### 1.8 CONCRETE SAMPLING AND TESTING

Testing by the Contractor must include sampling and testing concrete materials proposed for use in the work and testing the design mix for each class of concrete. Perform quality control testing during construction.

Sample and test concrete aggregate materials proposed for use in the work in accordance with ASTM C 33/C 33M.

Sample and test portland cement in accordance with ASTM C 150/C 150M.

Sample and test air-entraining admixtures in accordance with ASTM C233/C233M.

Testing must be performed by a Grade I Testing Technician.

## PART 2 PRODUCTS

### 2.1 MATERIALS FOR FORMS



Provide wood, plywood, plastic, carton, or steel. Use plywood or steel forms where a smooth form finish is required.

2.1.1 Wood Forms

Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with DOC/NIST PS1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining.

2.1.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2.2 CONCRETE

2.2.1 Contractor-Furnished Mix Design

ACI/MCP-1, ACI/MCP-2, and ACI/MCP-3 except as otherwise specified. Indicate the compressive strength (f'c) of the concrete for each portion of the structure(s) and as specified below.

| Location  | f'c<br>(Min. 28-<br>Day Comp.<br>Strength)<br>(psi) | ASTM C 33/C 33M<br>Maximum<br>Nominal<br>Aggregate<br>(Size No.) | Range<br>of<br>Slump<br>(inches) | Water-<br>Cement<br>Ratio<br>(by weight) | Maximum<br>Air<br>Entr.<br>(percent) |
|-----------|---|--|----------------------------------|--|--------------------------------------|
| All areas | 4,500   | 1 1/2"   | 4 +/-1                           | 0.45                                     | 6 +/-1.5                             |

Maximum slump shown above may be increased 1 inch for methods of consolidation other than vibration. Slump may be increased to 8 inches when superplasticizers are used. Provide air entrainment using air-entraining admixture. Provide air entrainment within plus or minus 1.5 percent of the value specified.

2.2.1.1 Mix Proportions for Normal Weight Concrete

Trial design batches, mixture proportioning studies, and testing requirements for various classes and types of concrete specified are the responsibility of the Contractor. Base mixture proportions on compressive strength as determined by test specimens fabricated in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39/C 39M. Samples of all materials used in mixture proportioning studies must be representative of those proposed for use in the project and must be accompanied by the manufacturer's or producer's test report indicating compliance with these specifications. Base trial mixtures having proportions, consistencies, and air content suitable for the work on methodology described in ACI/MCP-1. In the trial mixture, use at least three different water-cement ratios for each type of mixture, which must produce a range of strength encompassing those required for each class and type of concrete required on the project. The maximum water-cement ratio required must be based on equivalent water-cement ratio calculations as determined by the conversion from the weight ratio of water to cement plus pozzolan, and ground granulated blast-furnace slag by

weight equivalency method. Design laboratory trial mixture for maximum permitted slump and air content. Each combination of material proposed for use must have separate trial mixture, except for accelerator or retarder use can be provided without separate trial mixture. Report the temperature of concrete in each trial batch. For each water-cement ratio, at least three test cylinders for each test age must be made and cured in accordance with ASTM C 192/C 192M and tested in accordance with ASTM C 39/C 39M for 7 and 28 days. From these results, plot a curve showing the relationship between water-cement ratio and strength for each set of trial mix studies. In addition, plot a curve showing the relationship between 7 and 28 day strengths.

#### 2.2.1.2 Required Average Strength of Mix Design

The selected mixture must produce an average compressive strength exceeding the specified strength by the amount indicated in ACI/MCP-2. When a concrete production facility has a record of at least 15 consecutive tests, the standard deviation must be calculated and the required average compressive strength must be determined in accordance with ACI/MCP-2. When a concrete production facility does not have a suitable record of tests to establish a standard deviation, the required average strength must follow ACI/MCP-2 requirements.

#### 2.2.2 Ready-Mix Concrete

Provide concrete that meets the requirements of ASTM C 94/C 94M.

Ready-mixed concrete manufacturer must provide duplicate delivery tickets with each load of concrete delivered. Provide delivery tickets with the following information in addition to that required by ASTM C 94/C 94M:

Type and brand cement

Cement content in 95-pound bags per cubic yard of concrete

Maximum size of aggregate

Amount and brand name of admixtures

Total water content expressed by water/cement ratio

#### 2.2.3 Concrete Curing Materials

##### 2.2.3.1 Absorptive Cover

Provide burlap cloth cover for curing concrete made from jute or kenaf, weighing 10 ounces plus or minus 5 percent per square yard when clean and dry, conforming to ASTM C 171, Class 3; or cover may be cotton mats as approved.

##### 2.2.3.2 Moisture-Retaining Cover

Provide waterproof paper cover for curing concrete conforming to ASTM C 171, regular or white, or polyethylene sheeting conforming to ASTM C 171, or polyethylene-coated burlap consisting of a laminate of burlap and a white opaque polyethylene film permanently bonded to the burlap; burlap must

conform to ASTM C 171, Class 3, and polyethylene film must conform to ASTM C 171. When tested for water retention in accordance with ASTM C 156, weight of water lost 72 hours after application of moisture retaining covering material must not exceed 0.039 gram per square centimeter of the mortar specimen surface.

#### 2.2.3.3 Membrane-Forming Curing Compound

Provide liquid type compound conforming to ASTM C 309, Type 1, clear, Type 1D with fugitive dye for interior work and Type 2, white, pigmented for exterior work.

### 2.3 MATERIALS

#### 2.3.1 Cement

ASTM C 150/C 150M, Type I or II blended cement except as modified herein. Provide blended cement that consists of a mixture of ASTM C 150/C 150M, Type II, cement and one of the following materials: ASTM C 618 pozzolan or fly ash, ASTM C 989 ground granulated blast-furnace slag. For portland cement manufactured in a kiln fueled by hazardous waste, maintain a record of source for each batch. For exposed concrete, use one manufacturer for each type of cement, ground slag, fly ash, and pozzolan.

##### 2.3.1.1 Fly Ash and Pozzolan

ASTM C 618, Type N, F, or C, except that the maximum allowable loss on ignition must be 6 percent for Types N and F. Add with cement. If used, Fly ash content must be a minimum of 40 percent by weight of cementitious material, provided the fly ash does not reduce the amount of cement in the concrete mix below the minimum requirements of local building codes. Where the use of fly ash cannot meet the minimum level, provide the maximum amount of fly ash permissible that meets the code requirements for cement content. Report the chemical analysis of the fly ash in accordance with ASTM C 311. Evaluate and classify fly ash in accordance with ASTM D 5759.

High contents of supplementary cementitious materials can have some detrimental effects on the concrete properties, such as slowing excessively the strength gain rate, and delaying and increasing the difficulty of finishing. The recommended maximum content (by weight of the total cementitious material) for these materials are:

1. For GGBF slag: 50 percent
2. For fly ash or natural pozzolan: 40 percent (25 percent in cold climates)

##### 2.3.1.2 Ground Granulated Blast-Furnace Slag

ASTM C 989, Grade 100 or 120. Slag content must be a minimum of 50 percent by weight of cementitious material.

##### 2.3.1.3 Portland Cement

Provide cement that conforms to ASTM C 150/C 150M, Type I. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

### 2.3.2 Water

Minimize the amount of water in the mix. The amount of water must not exceed 45 percent by weight of cementitious materials (cement plus pozzolans), and in general, improve workability by adjusting the grading rather than by adding water. Water must be fresh, clean, and potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

### 2.3.3 Aggregates

ASTM C 33/C 33M, except as modified herein. Furnish aggregates for exposed concrete surfaces from one source. Provide aggregates that do not contain any substance which may be deleteriously reactive with the alkalis in the cement.

Aggregates must not possess properties or constituents that are known to have specific unfavorable effects in concrete when tested in accordance with ASTM C 295.

#### 2.3.3.1 Aggregates/Combined Aggregate Gradation (Floor Slabs Only)

ASTM C 33/C 33M, uniformly graded and as follows: Nominal maximum aggregate size of 1 inch. A combined sieve analysis must indicate a well graded aggregate from coarsest to finest with not more than 18 percent and not less than 8 percent retained on an individual sieve, except that less than 8 percent may be retained on coarsest sieve and on No. 50 (0.3mm) sieve, and less than 8 percent may be retained on sieves finer than No. 50 (0.3mm). Provide sand that is at least 50 percent natural sand.

### 2.3.4 Nonshrink Grout

ASTM C 1107/C 1107M.

### 2.3.5 Admixtures

ASTM C 494/C 494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures.

#### 2.3.5.1 Air-Entraining

ASTM C260/C260M.

#### 2.3.5.2 High Range Water Reducer (HRWR) (Superplasticizers)

ASTM C 494/C 494M, Type F and Type G (HRWR retarding admixture) and ASTM C 1017/C 1017M.

#### 2.3.5.3 Pozzolan

Provide fly ash or other pozzolans used as admixtures that conform to ASTM C 618.

### 2.3.6 Vapor Barrier

ASTM E 1745 polyethylene sheeting, minimum 10 mil thickness.

#### 2.3.7 Materials for Curing Concrete

Use water-based curing compounds, sealers, and coatings with low (maximum 160 grams/liter, less water and less exempt compounds) VOC content.

##### 2.3.7.1 Impervious Sheeting

ASTM C 171; waterproof paper, clear or white polyethylene sheeting, or polyethylene-coated burlap.

##### 2.3.7.2 Pervious Sheeting

AASHTO M 182.

##### 2.3.7.3 Liquid Membrane-Forming Compound

ASTM C 309, white-pigmented, Type 2, Class B.

#### 2.3.8 Expansion/Contraction Joint Filler

ASTM D 1751, ASTM D 1752, cork or 100 percent post-consumer paper meeting ASTM D 1752 (subparagraphs 5.1 to 5.4). Material must be 1/2 inch thick, unless otherwise indicated.

##### 2.3.8.1 Preformed Joint Filler Strips

Provide nonextruding and resilient bituminous type filler strips conforming to ASTM D 1751.

#### 2.3.9 Joint Sealants

Use concrete penetrating sealers with a low (maximum 100 grams/liter, less water and less exempt compounds) VOC content.

##### 2.3.9.1 Horizontal Surfaces, 3 Percent Slope, Maximum

ASTM D 6690 or ASTM C 920, Type M, Class 25, Use T.

##### 2.3.9.2 Vertical Surfaces Greater Than 3 Percent Slope

ASTM C 920, Type M, Grade NS, Class 25, Use T.

#### 2.4 REINFORCEMENT

##### 2.4.1 Reinforcing Bars

ACI/MCP-2 unless otherwise specified. Use deformed steel. ASTM A615/A615M and AASHTO M 322M/M 322 with the bars marked A, S, W, Grade 60.

## 2.4.2 Wire

### 2.4.2.1 Steel Wire

Wire must conform to ASTM A82/A82M.

### 2.4.3 Reinforcing Bar Supports

Provide bar ties and supports of coated or non-corrodible material.

### 2.4.4 Fiber-Reinforced Concrete

In addition to the requirements specified above, provide fiber reinforced concrete in accordance with ASTM C 1116/C 1116M Type III, synthetic fiber reinforced concrete, and as follows. Synthetic reinforcing fibers must be 100 percent virgin monofilament polypropylene fibers, with a minimum of 10 percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content. Provide fibers that have a specific gravity of 0.9, a minimum tensile strength of 70 ksi, graded per manufacturer, and specifically manufactured to an optimum gradation for use as concrete secondary reinforcement. Use a minimum of 1.5 pounds of fibers per cubic yard of concrete. Add fibers at the batch plant.

### 2.4.5 Supports for Reinforcement

Supports include bolsters, chairs, spacers, and other devices necessary for proper spacing, supporting, and fastening reinforcing bars and wire fabric in place.

Provide wire bar type supports conforming to ACI/MCP-3, ACI/MCP-4 and CRSI 10MSP.

## 2.5 CLASSIFICATION AND QUALITY OF CONCRETE

### 2.5.1 Concrete Classes and Usage

Provide concrete classes, compressive strength, requirements for air entrainment, and usage as follows:

| <u>CONCRETE CLASS</u> | <u>MIN. 28-DAY COMPRESSIVE STRENGTH POUNDS PER SQ. IN.</u> | <u>REQUIREMENT FOR AIR ENTRAINMENT</u> | <u>USAGE</u>  |
|-----------------------|--|--|---|
| 4.5A                  | 4,500  | Air-entrained                          | For structural concrete work exposed to freezing and thawing, unless otherwise indicated or specified, such as exterior slabs on grade. |
| 4N                    | 4,000  | Nonair-                                | For structural concrete   |

2.5.2 Limits for Concrete Proportions

Provide limits for maximum water/cement ratio and minimum cement content for each concrete class as follows:

| <u>CONCRETE CLASS</u> | <u>MAX. WATER/CEMENT RATIO BY WEIGHT</u> | <u>MIN. CEMENT FOR 3- TO 4-INCH SLUMP, (NO. OF 94- POUND SACKS) PER CU. YD.</u> |
|-----------------------|--|---|
| 4.5A                  | 0.45                                     | 6.0   |

\* Weight of water to weight of cement in pounds in one cubic yard of concrete

2.5.3 Maximum Size of Aggregate

Size of aggregate, designated by the sieve size on which maximum amount of retained coarse aggregate is 5 to 10 percent by weight, must be as follows:

| <u>MAXIMUM SIZE OF AGGREGATE</u> | <u>ASTM C 33/C 33M SIZE NUMBER</u> | <u>TYPE OF CONSTRUCTION</u>  |
|----------------------------------|------------------------------------|--|
| 1-1/2 inches                     | 467                                | Monolithic slabs on ground, concrete fill, and other flatwork having a depth of not less than 5 inches and a clear distance between reinforcing bars of not less than 2 inches |

Maximum size of aggregate may be that required for most critical type of construction using that concrete class.

Specify gradation of aggregates for separate floor topping.

2.5.4 Slump

Provide slump for concrete at time and in location of placement as follows:

| <u>TYPE OF CONSTRUCTION</u> | <u>SLUMP</u>                                  |
|-----------------------------|---|
| Monolithic slabs            | Not less than 3 inches nor more than 5 inches |

2.5.5 Total Air Content

Air content of exposed concrete and interior concrete must be in accordance with ASTM C260/C260M and/or as follows:

| <u>LIMITS CONCRETE EXPOSURE</u>              | <u>REQUIREMENT FOR AIR ENTRAINMENT</u> | <u>MAXIMUM SIZE OF AGGREGATE</u> | <u>TOTAL AIR CONTENT BY VOLUME</u> |
|--|--|----------------------------------|------------------------------------|
| Exposed to freezing and thawing or subjected | Air-entrained                          | 1-1/2                            | 4.5 to 7.5 percent                 |

to hydraulic  
pressure

Provide concrete exposed to freezing and thawing or subjected to hydraulic pressure that is air-entrained by addition of approved air-entraining admixture to concrete mix.

### PART 3 EXECUTION

#### 3.1 EXAMINATION

Do not begin installation until substrates have been properly constructed; verify that substrates are plumb and true.

If substrate preparation is the responsibility of another installer, notify Architect/Engineer of unsatisfactory preparation before processing.

Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify Architect/Engineer and wait for instructions before beginning installation.

#### 3.2 PREPARATION

Determine quantity of concrete needed and minimize the production of excess concrete. Designate locations or uses for potential excess concrete before the concrete is poured.

##### 3.2.1 General

Surfaces against which concrete is to be placed must be free of debris, loose material, standing water, snow, ice, and other deleterious substances before start of concrete placing.

Remove standing water without washing over freshly deposited concrete. Divert flow of water through side drains provided for such purpose.

##### 3.2.2 Subgrade Under Slabs on Ground

Before construction of slabs on ground, have underground work on pipes and conduits completed and approved.

Previously constructed subgrade or fill must be cleaned of foreign materials and inspected by the Contractor for adequate compaction and surface tolerances as specified.

Actual density of top 12 inches of subgrade soil material-in-place must not be less than the following percentages of maximum density of same soil material compacted at optimum moisture content in accordance with ASTM D 1557.

| <u>SOIL MATERIAL</u>       | <u>PERCENT MAXIMUM DENSITY</u> |
|----------------------------|--------------------------------|
| Capillary water barrier    | 100                            |
| Cohesionless soil material | 100                            |
| Cohesive soil material     | 95                             |



Finish surface of capillary water barrier under interior slabs on ground must not show deviation in excess of 1/4 inch when tested with a 10-foot straightedge parallel with and at right angles to building lines.

Finished surface of subgrade or fill under exterior slabs on ground must not be more than 0.02-foot above or 0.10-foot below elevation indicated.

Prepare subgrade or fill surface under exterior slabs on ground as specified for subgrade under foundations and footings.

### 3.2.3 Formwork

Complete and approve formwork. Remove debris and foreign material from interior of forms before start of concrete placing.

### 3.2.4 Edge Forms and Screed Strips for Slabs

Set edge forms or bulkheads and intermediate screed strips for slabs to obtain indicated elevations and contours in finished slab surface and must be strong enough to support vibrating bridge screeds or roller pipe screeds if nature of specified slab finish requires use of such equipment. Align concrete surface to elevation of screed strips by use of strike-off templates or approved compacting-type screeds.

### 3.2.5 Reinforcement and Other Embedded Items

Secure reinforcement, joint materials, and other embedded materials in position, inspected, and approved before start of concrete placing.

## 3.3 FORMS

ACI/MCP-2. Provide forms and shoring for concrete placement. Set forms mortar-tight and true to line and grade. Chamfer above grade exposed joints, edges, and external corners of concrete 0.75 inch unless otherwise indicated. Provide formwork with clean-out openings to permit inspection and removal of debris.

### 3.3.1 General

Construct forms to conform, within the tolerances specified, to shapes dimensions, lines, elevations, and positions of cast-in-place concrete members as indicated. Forms must be supported, braced, and maintained sufficiently rigid to prevent deformation under load.

### 3.3.2 Design and Construction of Formwork

Provide formwork design and construction that conforms to ACI/MCP-2, Chapter 4.

Provide forms that are tight to prevent leakage of cement paste during concrete placing.

Support form facing materials by structural members spaced close to prevent deflection of form facing material. Fit forms placed in successive units for continuous surfaces to accurate alignment to ensure a smooth completed surface within the tolerances specified. Where necessary to maintain the

tolerances specified, such as long spans where immediate supports are not possible, camber formwork for anticipated deflections in formwork due to weight and pressure of fresh concrete and to construction loads.

Chamfer exposed joints, edges, and external corners a minimum of 3/4 inch by moldings placed in corners of column, beam, and wall forms.

Provide shores and struts with a positive means of adjustment capable of taking up formwork settlement during concrete placing operations. Obtain adjustment with wedges or jacks or a combination thereof. When adequate foundations for shores and struts cannot be secured, provide trussed supports.

Provide forms that are readily removable without impact, shock, or damage to concrete.

### 3.3.3 Coating

Before concrete placement, coat the contact surfaces of forms with a nonstaining mineral oil, nonstaining form coating compound, or two coats of nitrocellulose lacquer. Do not use mineral oil on forms for surfaces to which adhesive, paint, or other finish material is to be applied.

### 3.3.4 Forms for Standard Rough Form Finish

Give rough form finish concrete formed surfaces that are to be concealed by other construction, unless otherwise specified.

Form facing material for standard rough form finish must be the specified concrete form plywood or other approved form facing material that produces concrete surfaces equivalent in smoothness and appearance to that produced by new concrete form plywood panels.

For concrete surfaces exposed only to the ground, undressed, square-edge, 1-inch nominal thickness lumber may be used. Provide horizontal joints that are level and vertical joints that are plumb.

### 3.3.5 Forms for Standard Smooth Form Finish

Give smooth form finish concrete formed surfaces that are to be exposed to view or that are to be covered with coating material applied directly to concrete or with covering material bonded to concrete, such as waterproofing, dampproofing, painting, or other similar coating system.

Form facing material for standard smooth finish must be the specified overlaid concrete form plywood or other approved form facing material that is nonreactive with concrete and that produce concrete surfaces equivalent in smoothness and appearance to that produced by new overlaid concrete form plywood panels.

Maximum deflection of form facing material between supports and maximum deflection of form supports such as studs and wales must not exceed 0.0025 times the span.

Provide arrangement of form facing sheets that are orderly and symmetrical, and sheets that are in sizes as large as practical.

Arrange panels to make a symmetrical pattern of joints. Horizontal and vertical joints must be solidly backed and butted tight to prevent leakage and fins.

### 3.3.6 Tolerances for Form Construction

Construct formwork to ensure that after removal of forms and prior to patching and finishing of formed surfaces, provide concrete surfaces in accordance with tolerances specified in ACI/MCP-1 and ACI/MCP-2.

### 3.3.7 Removal of Forms and Supports

After placing concrete, forms must remain in place for the time periods specified in ACI/MCP-4. Do not remove forms (except those used for slabs on grade and slip forms) until the client determines that the concrete has gained sufficient strength to support its weight and superimposed loads. Base such determination on compliance with one of the following:

- a. The plans and specifications stipulate conditions for removal of forms and shores, and such conditions have been followed, or
- b. The concrete has been properly tested with an appropriate ASTM standard test method designed to indicate the concrete compressive strength, and the test results indicate that the concrete has gained sufficient strength to support its weight and superimposed loads.

Prevent concrete damage during form removal. Clean all forms immediately after removal.

#### 3.3.7.1 Special Requirements for Reduced Time Period

Forms may be removed earlier than specified if ASTM C 39/C 39M test results of field-cured samples from a representative portion of the structure indicate that the concrete has reached a minimum of 85 percent of the design strength.

## 3.4 FORMED SURFACES

### 3.4.1 Preparation of Form Surfaces

Coat contact surfaces of forms with form-coating compound before reinforcement is placed. Provide a commercial formulation form-coating compound that does not bond with, stain, nor adversely affect concrete surfaces and impair subsequent treatment of concrete surfaces that entails bonding or adhesion nor impede wetting of surfaces to be cured with water or curing compounds. Do not allow excess form-coating compound to stand in puddles in the forms nor to come in contact with concrete against which fresh concrete is placed. Make thinning of form-coating compound with thinning agent of the type, in the amount, and under the conditions recommended by form-coating compound manufacturer's printed or written directions.

### 3.4.2 Tolerances

ACI/MCP-4 and as indicated.

### 3.4.3 As-Cast Form

Provide form facing material producing a smooth, hard, uniform texture on the concrete. Arrange facing material in an orderly and symmetrical manner and keep seams to a practical minimum. Support forms as necessary to meet required tolerances. Do not use material with raised grain, torn surfaces, worn edges, patches, dents, or other defects which can impair the texture of the concrete surface.

## 3.5 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

ACI/MCP-2. Provide bars, wire ties, supports, and other devices necessary to install and secure reinforcement. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

### 3.5.1 General

Provide details of reinforcement that are in accordance with ACI/MCP-3 and ACI/MCP-4 and as specified.

### 3.5.2 Vapor Barrier]

Provide beneath the on-grade concrete floor slab. Use the greatest widths and lengths practicable to eliminate joints wherever possible. Lap joints a minimum of 12 inches and tape joints. Remove torn, punctured, or damaged vapor barrier material and provide with new vapor barrier prior to placing concrete. Concrete placement must not damage vapor barrier material.

### 3.5.3 Reinforcement Supports

Place reinforcement and secure with non corrodible chairs or spacers . For supporting reinforcement on the ground, use concrete or other non corrodible material, having a compressive strength equal to or greater than the concrete being placed.

### 3.5.4 Splicing

As indicated. For splices not indicated ACI/MCP-2. Do not splice at points of maximum stress. Overlap welded wire fabric the spacing of the cross wires, plus 2 inches.

### 3.5.5 Cover

ACI/MCP-2 for minimum coverage, unless otherwise indicated.

### 3.5.6 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

### 3.5.7 Construction Joints

Locate joints to least impair strength. Continue reinforcement across joints unless otherwise indicated.

### 3.5.8 Expansion Joints and Contraction Joints

Make expansion joints 1/2 inch wide unless indicated otherwise. Completely fill joints exposed to weather with joint filler material and joint sealant. Do not extend reinforcement or other embedded metal items bonded to the concrete through any expansion joint unless an expansion sleeve is used. Provide contraction joints, either formed or saw cut or cut with a jointing tool, to the indicated depth after the surface has been finished. Complete saw joints within 4 to 12 hours after concrete placement. Protect joints from intrusion of foreign matter.

### 3.5.9 Fabrication

Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

Provide fabrication tolerances that are in accordance with ACI/MCP-1, ACI/MCP-2 and ACI/MCP-3.

Provide hooks and bends that are in accordance with ACI/MCP-3 and ACI/MCP-4.

Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

Tolerance on nominally square-cut, reinforcing bar ends must be in accordance with ACI/MCP-3.

Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

Do not use reinforcement that has any of the following defects:

- a. Bar lengths, depths, and bends beyond specified fabrication tolerances
- b. Bends or kinks not indicated on drawings or approved shop drawings
- c. Bars with reduced cross-section due to rusting or other cause

Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

### 3.5.10 Placing Reinforcement

Place reinforcement in accordance with ACI/MCP-3 and ACI/MCP-4.

For slabs on grade (over earth or over capillary water barrier) footing reinforcement, support bars on precast concrete blocks, spaced at intervals

required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

Contractor must cooperate with other trades in setting of anchor bolts, inserts, and other embedded items. Where conflicts occur between locating reinforcing and embedded items, the Contractor must notify the Contracting Officer so that conflicts may be reconciled before placing concrete. Anchors and embedded items must be positioned and supported with appropriate accessories.

Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

Provide supports for reinforcing bars that are sufficient in number and sufficiently heavy to carry the reinforcement they support, and in accordance with ACI/MCP-3, ACI/MCP-4 and CRSI 10MSP. Do not use supports to support runways for concrete conveying equipment and similar construction loads.

Equip supports on ground and similar surfaces with sand-plates.

Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.

With the exception of temperature reinforcement, tied to main steel approximately 24 inches on center, reinforcement must be accurately placed, securely tied at intersections with 18-gage annealed wire, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to ACI/MCP-3.

Bending of reinforcing bars partially embedded in concrete is permitted only as specified in ACI/MCP-3 and ACI/MCP-4.

#### 3.5.11 Spacing of Reinforcing Bars

Spacing must be as indicated. If not indicated, spacing must be in accordance with the ACI/MCP-3 and ACI/MCP-4.

Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to approval.

#### 3.5.12 Concrete Protection for Reinforcement

Concrete protection must be in accordance with the ACI/MCP-3 and ACI/MCP-4.

### 3.6 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

ASTM C 94/C 94M, and ACI/MCP-2, except as modified herein. Batching equipment must be such that the concrete ingredients are consistently measured within the following tolerances: 1 percent for cement and water, 2

percent for aggregate, and 3 percent for admixtures. Furnish mandatory batch ticket information for each load of ready mix concrete.

#### 3.6.1 Measuring

Make measurements at intervals as specified in paragraphs entitled "Sampling" and "Testing."

#### 3.6.2 Mixing

ASTM C 94/C 94M and ACI/MCP-2. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or addition of cement to aggregates if the air temperature is less than 84 degrees F. Reduce mixing time and place concrete within 60 minutes if the air temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and water-cement ratio are not exceeded. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch.

#### 3.6.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

### 3.7 PLACING CONCRETE

Place concrete as soon as practicable after the forms and the reinforcement have been inspected and approved. Do not place concrete when weather conditions prevent proper placement and consolidation; in uncovered areas during periods of precipitation; or in standing water. Prior to placing concrete, remove dirt, construction debris, water, snow, and ice from within the forms. Deposit concrete as close as practicable to the final position in the forms. Do not exceed a free vertical drop of 3 feet from the point of discharge. Place concrete in one continuous operation from one end of the structure towards the other. Position grade stakes on 10 foot centers maximum in each direction when pouring interior slabs and on 20 foot centers maximum for exterior slabs.

#### 3.7.1 General Placing Requirements

Deposit concrete continuously or in layers of such thickness that no concrete is placed on concrete which has hardened sufficiently to cause formation of seams or planes of weakness within the section. If a section cannot be placed continuously, provide construction joints as specified. Perform concrete placing at such a rate that concrete which is being integrated with fresh concrete is still plastic. Deposit concrete as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation.

Concrete to receive other construction must be screeded to proper level to avoid excessive skimming or grouting.

Do not use concrete which becomes nonplastic and unworkable or does not meet quality control limits as specified or has been contaminated by foreign materials. Use of retempered concrete is permitted. Remove rejected concrete from the site.

### 3.7.2 Vibration

ACI/MCP-2. Furnish a spare, working, vibrator on the job site whenever concrete is placed. Consolidate concrete slabs greater than 4 inches in depth with high frequency mechanical vibrating equipment supplemented by hand spading and tamping. Operate internal vibrators with vibratory element submerged in the concrete, with a minimum frequency of not less than 6000 impulses per minute when submerged. Do not use vibrators to transport the concrete in the forms. Insert and withdraw vibrators approximately 20 inches apart. Penetrate the previously placed lift with the vibrator when more than one lift is required. Place concrete in 20 inch maximum vertical lifts. Use external vibrators on the exterior surface of the forms when internal vibrators do not provide adequate consolidation of the concrete.

### 3.7.3 Pumping

ACI/MCP-2. Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed 2 inches. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

### 3.7.4 Cold Weather

ACI/MCP-2. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any 1 hour and 50 degrees F per 24 hours after heat application.

### 3.7.5 Hot Weather

Maintain required concrete temperature using Figure 2.1.5 in ACI/MCP-2 to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious



sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

#### 3.7.6 Follow-up

Check concrete within 24 hours of placement for flatness, levelness, and other specified tolerances. Adjust formwork and placement techniques on subsequent pours to achieve specified tolerances.

#### 3.7.7 Placing Concrete Slabs

Place and consolidate concrete for slabs in a continuous operation, within the limits of approved construction joints until placing of panel or section is completed.

During concrete placing operations, consolidate concrete by mechanical vibrating equipment so that concrete is worked around reinforcement and other embedded items and into corners. Consolidate concrete in remainder of slabs by vibrating bridge screeds, roller pipe screeds, or other approved method. Limit consolidation operations to time necessary to obtain consolidation of concrete without bringing an excess of fine aggregate to the surface. Concrete to be consolidated must be as dry as practical and surfaces thereof must not be manipulated prior to finishing operations. Bring concrete correct level with a straightedge and struck-off. Use bull floats or darbies to smooth surface, leaving it free of humps or hollows. Sprinkling of water on plastic surface is not permitted.

Provide finish of slabs as specified.

### 3.8 FLOOR, SLAB, AND PAVEMENT FINISHES AND MISCELLANEOUS CONSTRUCTION

ACI/MCP-2, unless otherwise specified. Where straightedge measurements are specified, Contractor must provide straightedge.

#### 3.8.1 Finish

Place, consolidate, and immediately strike off concrete to obtain proper contour, grade, and elevation before bleedwater appears. Permit concrete to attain a set sufficient for floating and supporting the weight of the finisher and equipment. If bleedwater is present prior to floating the surface, drag the excess water off or remove by absorption with porous materials. Do not use dry cement to absorb bleedwater.

##### 3.8.1.1 Scratched

Use for surfaces intended to receive bonded applied cementitious applications. After the concrete has been placed, consolidated, struck off, and leveled to a Class C tolerance as defined below, roughen the surface with stiff brushes or rakes before final set.

##### 3.8.1.2 Floated

Use for exterior slabs where not otherwise specified. After the concrete has been placed, consolidated, struck off, and leveled, do not work the concrete further, until ready for floating. Whether floating with a wood, magnesium, or composite hand float, with a bladed power trowel equipped with float shoes, or with a powered disc, float must begin when the surface has

stiffened sufficiently to permit the operation. During or after the first floating, check surface with a 10 foot straightedge applied at no less than two different angles, one of which is perpendicular to the direction of strike off. Cut down high spots and fill low spots during this procedure to produce a surface level within 1/4 inch in 10 feet.

#### 3.8.1.3 Concrete Containing Silica Fume

Finish using magnesium floats or darbies.

#### 3.8.2 Flat Floor Finishes

##### 3.8.2.1 Remedies for Out of Tolerance Work

Contractor is required to repair and retest any floors not meeting specified tolerances. Prior to repair, Contractor must submit and receive approval for the proposed repair, including product data from any materials proposed. Repairs must not result in damage to structural integrity of the floor. For floors exposed to public view, repairs must prevent any uneven or unusual coloring of the surface.

#### 3.9 CURING AND PROTECTION

ACI/MCP-2 unless otherwise specified. Begin curing immediately following form removal. Avoid damage to concrete from vibration created by movement of equipment in the vicinity, disturbance of formwork or protruding reinforcement, and any other activity resulting in ground vibrations. Protect concrete from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks, and oil stains. Do not allow concrete to dry out from time of placement until the expiration of the specified curing period. Do not use membrane-forming compound on surfaces where appearance would be objectionable, on any surface to be painted, where coverings are to be bonded to the concrete, or on concrete to which other concrete is to be bonded. If forms are removed prior to the expiration of the curing period, provide another curing procedure specified herein for the remaining portion of the curing period.

##### 3.9.1 General

Protect freshly placed concrete from premature drying and cold or hot temperature and maintain without drying at a relatively constant temperature for the period of time necessary for hydration of cement and proper hardening of concrete.

Start initial curing as soon as free water has disappeared from surface of concrete after placing and finishing. Keep concrete moist for minimum 72 hours.

Final curing must immediately follow initial curing and before concrete has dried. Continue final curing until cumulative number of hours or fraction thereof (not necessarily consecutive) during which temperature of air in contact with the concrete is above 50 degrees F has totaled 168 hours. Alternatively, if tests are made of cylinders kept adjacent to the structure and cured by the same methods, final curing may be terminated when the average compressive strength has reached 70 percent of the 28-day design compressive strength. Prevent rapid drying at end of final curing period.

### 3.9.2 Moist Curing

Remove water without erosion or damage to the structure. Prevent water runoff.

#### 3.9.2.1 Ponding or Immersion

Continually immerse the concrete throughout the curing period. Water must not be more than 50 degrees F less than the temperature of the concrete. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

#### 3.9.2.2 Fog Spraying or Sprinkling

Apply water uniformly and continuously throughout the curing period. For temperatures between 40 and 50 degrees F, increase the curing period by 50 percent.

#### 3.9.2.3 Pervious Sheeting

Completely cover surface and edges of the concrete with two thicknesses of wet sheeting. Overlap sheeting 6 inches over adjacent sheeting. Provide sheeting that is at least as long as the width of the surface to be cured. During application, do not drag the sheeting over the finished concrete nor over sheeting already placed. Wet sheeting thoroughly and keep continuously wet throughout the curing period.

#### 3.9.2.4 Impervious Sheeting

Wet the entire exposed surface of the concrete thoroughly with a fine spray of water and cover with impervious sheeting throughout the curing period. Lay sheeting directly on the concrete surface and overlap edges 12 inches minimum. Provide sheeting not less than 18 inches wider than the concrete surface to be cured. Secure edges and transverse laps to form closed joints. Repair torn or damaged sheeting or provide new sheeting. Cover or wrap columns, walls, and other vertical structural elements from the top down with impervious sheeting; overlap and continuously tape sheeting joints; and introduce sufficient water to soak the entire surface prior to completely enclosing.

### 3.9.3 Liquid Membrane-Forming Curing Compound

Seal or cover joint openings prior to application of curing compound. Prevent curing compound from entering the joint. Apply in accordance with the recommendations of the manufacturer immediately after any water sheen which may develop after finishing has disappeared from the concrete surface. Provide and maintain compound on the concrete surface throughout the curing period. Do not use this method of curing where the use of Figure 2.1.5 in ACI/MCP-2 indicates that hot weather conditions cause an evaporation rate exceeding 0.2 pound of water per square foot per hour.

#### 3.9.3.1 Application

Unless the manufacturer recommends otherwise, apply compound immediately after the surface loses its water sheen and has a dull appearance, and before joints are sawed. Mechanically agitate curing compound thoroughly during use. Use approved power-spraying equipment to uniformly apply two

coats of compound in a continuous operation. The total coverage for the two coats must be 200 square feet maximum per gallon of undiluted compound unless otherwise recommended by the manufacturer's written instructions. The compound must form a uniform, continuous, coherent film that does not check, crack, or peel. Immediately apply an additional coat of compound to areas where the film is defective. Re-spray concrete surfaces subjected to rainfall within 3 hours after the curing compound application.

#### 3.9.3.2 Protection of Treated Surfaces

Prohibit pedestrian and vehicular traffic and other sources of abrasion at least 72 hours after compound application. Maintain continuity of the coating for the entire curing period and immediately repair any damage.

#### 3.9.4 Curing Periods

Follow ACI/MCP-2 guidelines. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the Contracting Officer.

#### 3.9.5 Curing Methods

Accomplish curing by moist curing, by moisture-retaining cover curing, by membrane curing, and by combinations thereof, as specified.

Moist curing:

Accomplish moisture curing by any of the following methods:

Keeping surface of concrete wet by covering with water

Continuous water spraying

Covering concrete surface with specified absorptive cover for curing concrete saturated with water and keeping absorptive cover wet by water spraying or intermittent hosing. Place absorptive cover to provide coverage of concrete surfaces and edges with a slight overlap over adjacent absorptive covers.

Moisture-cover curing:

Accomplish moisture-retaining cover curing by covering concrete surfaces with specified moisture-retaining cover for curing concrete. Place cover directly on concrete in widest practical width, with sides and ends lapped at least 3 inches. Weight cover to prevent displacement; immediately repair tears or holes appearing during curing period by patching with pressure-sensitive, waterproof tape or other approved method.

Membrane curing:

Accomplish membrane curing by applying specified membrane-forming curing compound to damp concrete surfaces as soon as moisture film has disappeared. Apply curing compound uniformly in a two-coat operation

by power-spraying equipment using a spray nozzle equipped with a wind guard. Apply second coat in a direction at right angles to direction of first coat. Total coverage for two coats must be not more than 200 square feet per gallon of curing compound. Respray concrete surfaces which are subjected to heavy rainfall within 3 hours after curing compound has been applied by method and at rate specified. Maintain continuity of coating for entire curing period and immediately repair damage to coating during this period.

Membrane-curing compounds must not be used on surfaces that are to be covered with coating material applied directly to concrete or with a covering material bonded to concrete, such as other concrete, liquid floor hardener, waterproofing, dampproofing, membrane roofing, painting, and other coatings and finish materials.

#### 3.9.6 Curing Formed Surfaces

Accomplish curing of formed surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

#### 3.9.7 Curing Unformed Surfaces

Accomplish initial curing of unformed surfaces by membrane curing.

Unless otherwise specified, accomplish final curing of unformed surfaces by any of curing methods specified above, as applicable.

#### 3.9.8 Temperature of Concrete During Curing

When temperature of atmosphere is 41 degrees F and below, maintain temperature of concrete at not less than 55 degrees F throughout concrete curing period or 45 degrees F when the curing period is measured by maturity. When necessary, make arrangements before start of concrete placing for heating, covering, insulation, or housing as required to maintain specified temperature and moisture conditions for concrete during curing period.

When the temperature of atmosphere is 80 degrees F and above or during other climatic conditions which cause too rapid drying of concrete, make arrangements before start of concrete placing for installation of wind breaks, of shading, and for fog spraying, wet sprinkling, or moisture-retaining covering of light color as required to protect concrete during curing period.

Changes in temperature of concrete must be uniform and not exceed 37 degrees F in any 1 hour nor 80 degrees F in any 24-hour period.

#### 3.9.9 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

#### 3.9.10 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

### 3.10 FIELD QUALITY CONTROL

#### 3.10.1 Sampling

ASTM C172/C172M. Collect samples of fresh concrete to perform tests specified. ASTM C 31/C 31M for making test specimens.

#### 3.10.2 Testing

##### 3.10.2.1 Slump Tests

ASTM C 143/C 143M. Take concrete samples during concrete placement. The maximum slump may be increased as specified with the addition of an approved admixture provided that the water-cement ratio is not exceeded. Perform tests at commencement of concrete placement, when test cylinders are made, and for each batch (minimum) or every 20 cubic yards (maximum) of concrete.

##### 3.10.2.2 Temperature Tests

Test the concrete delivered and the concrete in the forms. Perform tests in hot or cold weather conditions (below 50 degrees F and above 80 degrees F) for each batch (minimum) or every 20 cubic yards (maximum) of concrete, until the specified temperature is obtained, and whenever test cylinders and slump tests are made.

##### 3.10.2.3 Compressive Strength Tests

ASTM C 39/C 39M. Make five test cylinders for each set of tests in accordance with ASTM C 31/C 31M. Take precautions to prevent evaporation and loss of water from the specimen. Test two cylinders at 7 days, two cylinders at 28 days, and hold one cylinder in reserve. Take samples for strength tests of each mix design of concrete placed each day not less than once a day, nor less than once for each 160 cubic yards of concrete, nor less than once for each 5400 square feet of surface area for slabs. For the entire project, take no less than five sets of samples and perform strength tests for each mix design of concrete placed. Each strength test result must be the average of two cylinders from the same concrete sample tested at 28 days. If the average of any three consecutive strength test results is less than  $f'c$  or if any strength test result falls below  $f'c$  by more than 450 psi, take a minimum of three ASTM C 42/C 42M core samples from the in-place work represented by the low test cylinder results and test. Concrete represented by core test is considered structurally adequate if the average of three cores is equal to at least 85 percent of  $f'c$  and if no single core is less than 75 percent of  $f'c$ . Retest locations represented by erratic core strengths. Remove concrete not meeting strength criteria and provide new acceptable concrete. Repair core holes with nonshrink grout. Match color and finish of adjacent concrete.

##### 3.10.2.4 Air Content

ASTM C 173/C 173M or ASTM C231/C231M for normal weight concrete. Test air-entrained concrete for air content at the same frequency as specified for slump tests.

### 3.10.2.5 Strength of Concrete Structure

Compliance with the following is considered deficient if it fails to meet the requirements which control strength of structure in place, including following conditions:

Failure to meet compressive strength tests as evaluated

Reinforcement not conforming to requirements specified

Concrete which differs from required dimensions or location in such a manner as to reduce strength

Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified

Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration

Poor workmanship likely to result in deficient strength

### 3.10.2.6 Testing Concrete Structure for Strength

When there is evidence that strength of concrete structure in place does not meet specification requirements, make cores drilled from hardened concrete for compressive strength determination in accordance with ASTM C 42/C 42M, and as follows:

Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the Contracting Officer.

Test cores after moisture conditioning in accordance with ASTM C 42/C 42M if concrete they represent is more than superficially wet under service.

Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for 7 days before test and test dry if concrete they represent is dry under service conditions.

Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

Core specimens will be taken and tested by the Government. If the results of core-boring tests indicate that the concrete as placed does not conform to the drawings and specification, the cost of such tests and restoration required must be borne by the Contractor.

Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

Correct concrete work that is found inadequate by core tests in a manner approved by the Contracting Officer.

### 3.11 JOINTS

#### 3.11.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Locate construction joints as follows:

a . In slabs on ground, so as to divide slab into areas not in excess of 1,200 square feet

Joints must be perpendicular to main reinforcement. Reinforcement must be continued across construction joints.

#### 3.11.2 Control Joints in Slabs on Ground

Provide joints to form panels as indicated.

Joints must be 1/8-inch wide by 1/5 to 1/4 of slab depth and formed by inserting hand-pressed fiberboard strip into fresh concrete until top surface of strip is flush with slab surface or by cutting the concrete with a saw after the concrete has set. After concrete has cured for at least 7 days, the Contractor must remove inserts and clean groove of foreign matter and loose particles.

#### 3.11.3 Sealing Joints in Slabs on Ground

Isolation and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

### 3.12 INSTALLATION OF ANCHORAGE DEVICES

#### 3.12.1 General

Anchorage devices and embedded items required for other work that is attached to, or supported by, set and build in cast-in-place concrete as part of the work of this section, using setting drawings, instructions, and directions for work to be attached thereto.

#### 3.12.2 Placing Anchorage Devices

Anchorage devices and embedded items must be positioned accurately and supported against displacement. Fill openings in anchorage devices such as slots and threaded holes with an approved, removable material to prevent entry of concrete into openings.

### 3.13 CONCRETE CONVEYING

#### 3.13.1 Transfer of Concrete At Project Site



Handle concrete from point of delivery and transfer to concrete conveying equipment and to locations of final deposit as rapidly as practical by methods which prevent segregation and loss of concrete mix materials.

### 3.13.2 Mechanical Equipment for Conveying Concrete

Equipment must ensure a continuous flow of concrete at delivery end, as approved. Provide runways for wheeled concrete-conveying equipment from concrete delivery point to locations of final deposit. Interior surfaces of concrete conveying equipment must be free of hardened concrete, debris, water, snow, ice, and other deleterious substances.

-- End of Section --

## SECTION 33 11 00

### WATER PIPING

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK

Provide underground ductile iron water piping at size as indicated. Provide water main accessories including valves as specified or where indicated.

##### 1.2 RELATED SECTIONS

NONE

##### 1.3 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.

#### AMERICAN WATER WORKS ASSOCIATION (AWWA)

|                       |  |
|-----------------------|--|
| AWWA B300             | (2004) Hypochlorites   |
| AWWA C104/A21.4       | (2008) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water         |
| AWWA C105/A21.5(2005) | Polyethylene Encasement for Ductile-Iron Pipe Systems                            |
| AWWA C110/A21.10      | (2008) Ductile-Iron and Gray-Iron Fittings for Water                             |
| AWWA C111/A21.11      | (2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings          |
| AWWA C115/A21.15      | (2005) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges |
| AWWA C153/A21.53      | (2006) Ductile-Iron Compact Fittings for Water Service                           |
| AWWA C500             | (2002; R 2003) Metal-Seated Gate Valves for Water Supply Service                 |
| AWWA C509             | (2001) Resilient-Seated Gate Valves for Water Supply Service                     |
| AWWA C600             | (2005) Installation of Ductile-Iron Water Mains and Their Appurtenances          |
| AWWA C651             | (2005; Errata 2005) Standard for Disinfecting Water Mains                        |
| AWWA C800             | (2005) Underground Service Line Valves and Fittings                              |

#### ASME INTERNATIONAL (ASME)

ASME B16.1

(2005) Standard for Gray Iron Threaded Fittings; Classes 125 and 250

ASTM INTERNATIONAL (ASTM)

ASTM A 536

(1984e1; R 2004) Standard Specification for Ductile Iron Castings

## 1.4 SUBMITTALS

Product Data: Water main piping, fittings, joints, valves, valve pits, and couplings.

Test Results: Bacteriological Disinfection.

Certificates: Shop-applied lining

O&M / Manufacturer's Instructions: Tools/Keys/Instructions for operating gate valves

## 1.5 DELIVERY, STORAGE, AND HANDLING

### 1.5.1 Delivery and Storage

Inspect materials delivered to site for damage. Unload and store with minimum handling. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves, and hydrants free of dirt and debris.

### 1.5.2 Handling

Handle pipe, fittings, valves, hydrants, and other accessories in a manner to ensure delivery to the trench in sound undamaged condition. Take special care to avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place any other material or pipe inside a pipe or fitting after the coating has been applied. Carry, do not drag, pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. The interior of pipe and accessories shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during laying operations by plugging or other approved method. Before installation, the pipe shall be inspected for defects. Material found to be defective before or after laying shall be replaced with sound material without additional expense to the Government. Store rubber gaskets that are not to be installed immediately, under cover out of direct sunlight.

## PART 2 – PRODUCTS

### 2.1 WATER MAIN MATERIALS

#### 2.1.1 Piping Materials (Ductile-Iron Piping)

2.1.1.1 Pipe and Fittings: AWWA C151/A21.51, Class 52. (Flanged pipe, AWWA C115/A21.15. Fittings, AWWA C110/A21.10 or AWWA C153/A21.53); fittings with push-on joint ends conforming to the same requirements as fittings with mechanical-joint ends, except that the bell design shall be modified, as approved, for push-on joint]. Fittings shall have pressure rating at least equivalent to that of the pipe. Ends of pipe and fittings shall be suitable for the specified joints. Pipe and fittings shall have cement-mortar lining, AWWA C104/A21.4, standard thickness.

2.1.1.2 Joints and Jointing Material: **Joints for pipe and fittings shall be mechanical joints unless otherwise indicated.**

Insulating Joints: Designed to effectively prevent metal-to-metal contact at the joint between adjacent sections of piping. Joint shall be of the flanged type with insulating gasket, insulating bolt sleeves, and insulating washers. Gasket shall be of the dielectric type, full face, and in other respects as recommended in the Appendix to AWWA C115/A21.15. Bolts and nuts, as recommended in the Appendix to AWWA C115/A21.15.

Flanged Joints: Bolts, nuts, and gaskets for flanged connections as recommended in the Appendix to AWWA C115/A21.15. Flange for setscrewed flanges shall be of ductile iron, ASTM A 536, Grade 65-45-12, and conform to the applicable requirements of ASME B16.1, Class 250. Setscrews for setscrewed flanges shall be 190,000 psi tensile strength, heat treated and zinc-coated steel. Gasket and lubricants for setscrewed flanges, in accordance with applicable requirements for mechanical-joint gaskets specified in AWWA C111/A21.11. Design of setscrewed gasket shall provide for confinement and compression of gasket when joint to adjoining flange is made.

Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets, AWWA C111/A21.11.

Push-On Joints: Shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly, AWWA C111/A21.11.

Sleeve-Type Mechanical Coupled Joints: As specified in paragraph entitled "Sleeve-Type Mechanical Couplings."

#### 2.1.2 Piping Materials (PVC)

All piping determined to be PVC per the drawings (process flow diagram and mechanical layout) shall gray in color and schedule 80 PVC. The pipe sizes shall be as per what is shown on the drawings.

#### 2.1.3 Pressure Reducing Valve

The pressure reducing valve shall be 6-inches with 8-inch flanges as manufactured by Cla-val company (or equal), with model #: 694-01BCDSVKC. The valve shall be epoxy coated, Ductile with Stainless Internal Trim, 150-lb flange, rated for a flow of 1,000 gpm, and a pressure reduction from 130 psi to 30 psi, Opening and Closing speed Controls, and Position Indicator (X101);

#### 2.1.4 Disinfection:

Chlorinating materials shall conform to Hypochlorite, Calcium and Sodium: AWWA B300.

### **PART 3 – EXECUTION**

#### **3.1 INSTALLATION OF PIPELINES**

##### 3.1.1 Location of Water Lines

Connect underground water main piping to the process piping lines where the process lines have been installed per the contract drawings

##### 3.1.3 Pipe Laying and Jointing

Install pipe and fittings in accordance with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe in a neat workmanlike manner accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports [where indicated and] where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 3 1/2 feet.

#### 3.1.4 Connections to Existing Water Lines

Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in coordination with and in accordance with the standard practices of Aqua New York.

The Contractor shall be responsible for the verification of existing piping and penetrations. Prior to ordering materials, expose all existing pipes which are to be connected to new pipelines. Verify the size, material, joint types, elevation, horizontal location, and pipe service of existing pipes, and inspect size and location of structure penetrations to verify adequacy of wall sleeves, and other openings before installing connecting pipes.

#### 3.1.6 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

#### 3.1.7 Installation of Ductile-Iron Piping, Specific

- a. Jointing: Make push-on, mechanical, or flanged joints with the gaskets, bolts, and nuts specified for this type joint. Make joints tight; avoid undue strain on flanges, fittings, valves, and other equipment and accessories. Align bolt holes for each flanged joint. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without overstraining the flange. When flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified, replace it by one of proper dimensions, use screwed flanges to make flanged joints where conditions prevent the use of full-length flanged pipe and assemble in accordance with the recommendations of the screwed flange manufacturer. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer. Assemble in accordance with the recommendations of the coupling manufacturer. Groove pipe in the field only with approved groove cutting equipment designed especially for the purpose and produced by a manufacturer of grooved joint couplings; secure approval for field-cut grooves before assembling the joint. Make insulating joints with the gaskets, sleeves, washers, bolts, and nuts previously specified for this type joint. Assemble insulating joints as specified for flanged joints, except that bolts with insulating sleeves shall be full size for the bolt holes. Ensure that there is no metal-to-metal contact between dissimilar metals after the joint has been assembled.

- b. Allowable Deflection: The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.
- c. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) and metal harness for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94/C 94M, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength. Metal harness shall be in accordance with the requirements of AWWA C600 for thrust restraint, using tie rods and clamps except as otherwise indicated.
- d. Exterior Protection: Completely encase buried ductile iron pipelines with polyethylene tube or sheet, using Class A polyethylene film, in accordance with AWWA C105/A21.5.

### 3.1.9 Disinfection

Prior to disinfection, obtain Contracting Officer approval of the proposed method for disposal of waste water from disinfection procedures. Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Fill piping systems with solution containing minimum of 50 parts per million of available chlorine and allow solution to stand for minimum of 24 hours. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 and 0.5 parts per million, or the residual chlorine content of domestic water supply. Obtain at least two consecutive satisfactory bacteriological samples from new water piping, analyze by a certified laboratory, and submit the results prior to the temporary GAC system being placed into service.

## 3.2 FIELD QUALITY CONTROL

### 3.2.1 Field Tests and Inspections

Prior to hydrostatic testing, obtain Contracting Officer approval of the proposed method for disposal of waste water from hydrostatic testing. The Contracting Officer will conduct field inspections and witness field tests specified in this section. The Contractor shall perform field tests, and provide labor, equipment, and incidentals required for testing. The Contractor shall produce evidence, when required, that any item of work has been constructed in accordance with the drawings and specifications. Do not begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least 5 days after placing of the concrete.

### 3.2.2 Testing Procedure

Provide hydrostatic testing per Aqua New York standards and local regulations. Otherwise, perform the following:

Test ductile-iron water mains in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints shall not exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other method.

For pressure test, use a hydrostatic pressure not less than 200 psi. Hold this pressure for not less than 2 hours. Prior to the pressure test, fill that portion of the pipeline being tested with water for a soaking period of not less than 24 hours. For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

### **3.3 CLEANUP**

Upon completion of the installation of water lines, and appurtenances, all debris and surplus materials resulting from the work shall be removed.

END OF SECTION

## SECTION 40 05 13

### PIPELINES, PROCESS PIPING

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK

Provide the above-grade process pipe, pipe supports, valves, fittings, connections, equipment, and other accessories located within the treatment plant.

##### 1.2 RELATED SECTIONS

##### 1.3 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.

#### AMERICAN WATER WORKS ASSOCIATION (AWWA)

|                  |   |
|------------------|---|
| AWWA C104/A21.4  | (2008) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water                    |
| AWWA C110/A21.10 | (2008) Ductile-Iron and Gray-Iron Fittings for Water  |
| AWWA C111/A21.11 | (2000) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings                     |
| AWWA C115/A21.15 | (2005) Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges            |
| AWWA C150/A21.50 | (2002; Errata 2003) Thickness Design of Ductile-Iron Pipe                                   |
| AWWA C151/A21.51 | (2002; Errata 2002) Ductile-Iron Pipe, Centrifugally Cast, for Water                        |
| AWWA C153/A21.53 | (2006) Ductile-Iron Compact Fittings for Water Service                                      |
| AWWA C500        | (2002; R 2003) Metal-Seated Gate Valves for Water Supply Service                            |
| AWWA C504        | (2006) Standard for Rubber-Seated Butterfly Valves  |
| AWWA C508        | (2001) Swing-Check Valves for Waterworks Service, 2 In. (50 mm) Through 24 In. (600 mm) NPS |
| AWWA C509        | (2001) Resilient-Seated Gate Valves for Water Supply Service                                |
| AWWA C651        | (2005; Errata 2005) Standard for Disinfecting Water Mains                                   |

#### ASME INTERNATIONAL (ASME)



|              |   |
|--------------|---|
| ASME B1.1    | (2003; R 2008) Unified Inch Screw Threads (UN and UNR Thread Form)                        |
| ASME B1.20.1 | (1983; R 2006) Pipe Threads, General Purpose (Inch)                                       |
| ASME B16.1   | (2005) Standard for Gray Iron Threaded Fittings; Classes 125 and 250                      |
| ASME B16.11  | (2005) Forged Fittings, Socket-Welding and Threaded                                       |
| ASME B16.20  | (2007) Metallic Gaskets for Pipe Flanges - Ring-Joint, Spiral Wound, and Jacketed         |
| ASME B16.21  | (2005) Nonmetallic Flat Gaskets for Pipe Flanges  |
| ASME B16.34  | (2004) Valves - Flanged, Threaded and Welding End   |
| ASME B16.42  | (1998; R 2006) Ductile Iron Pipe Flanges and Flanged Fittings, Classes 150 and 300        |
| ASME B16.5   | (2009) Standard for Pipe Flanges and Flanged Fittings: NPS 1/2 Through NPS 24             |
| ASME B18.2.1 | (1996; Addenda A 1999; Errata 2003; R 2005) Square and Hex Bolts and Screws (Inch Series) |
| ASME B18.2.2 | (1987; R 2005) Standard for Square and Hex Nuts   |
| ASME B31.3   | (2008) Process Piping   |

ASTM INTERNATIONAL (ASTM)

|                   |  |
|-------------------|--|
| ASTM A 126        | (2004) Standard Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings                                |
| ASTM A 153/A 153M | (2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware  |
| ASTM A 183        | (2003; R 2009) Standard Specification for Carbon Steel Track Bolts and Nuts  |
| ASTM A 268/A 268M | (2005a) Standard Specification for Seamless and Welded Ferritic and Martensitic Stainless Steel Tubing for General Service |
| ASTM A 269        | (2008) Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service                |
| ASTM A 307        | (2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength                               |
| ASTM A 312/A 312M | (2009) Standard Specification for Seamless, Welded, and Heavily Worked Austenitic Stainless Steel Pipes                    |
| ASTM A 36/A 36M   | (2008) Standard Specification for Carbon Structural Steel  |

|                   |  |
|-------------------|--|
| ASTM A 423/A 423M | (1995; R 2004) Standard Specification for Seamless and Electric-Welded Low-Alloy Steel Tubes                                       |
| ASTM A 47/A 47M   | (1999; R 2004) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process                                     |
| ASTM A 53/A 53M   | (2007) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless                              |
| ASTM A 536        | (1984e1; R 2004) Standard Specification for Ductile Iron Castings  |
| ASTM A 576        | (1990b; R 2006) Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality  |
| ASTM A 632        | (2004) Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing (Small-Diameter) for General Service       |
| ASTM A 727/A 727M | (2002; R 2007) Standard Specification for Carbon Steel Forgings for Piping Components with Inherent Notch Toughness                |
| ASTM A 780/A 780M | (2001; R 2006) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings                           |
| ASTM A 789/A 789M | (2008b) Standard Specification for Seamless and Welded Ferritic/Austenitic Stainless Steel Tubing for General Service              |
| ASTM A 815/A 815M | (2009) Standard Specification for Wrought Ferritic, Ferritic/Austenitic, and Martensitic Stainless Steel Piping Fittings           |
| ASTM D 1784       | (2008) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds |
| ASTM D 1785       | (2006) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120                              |
| ASTM D 2241       | (2005) Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)                                      |
| ASTM D 2464       | (2006) Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80                           |
| ASTM D 2466       | (2006) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40                                    |
| ASTM D 2467       | (2006) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80                                    |
| ASTM D 2564       | (2004e1) Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems                          |

|             |  |
|-------------|--|
| ASTM D 2683 | (2004) Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing |
| ASTM D 2737 | (2003) Polyethylene (PE) Plastic Tubing  |
| ASTM D 2855 | (1996; R 2002) Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings            |
| ASTM D 3222 | (2005) Unmodified Poly(Vinylidene Fluoride) (PVDF) Molding Extrusion and Coating Materials                                       |
| ASTM F 402  | (2005) Safe Handling of Solvent Cements, Primers, and Cleaners Used for Joining Thermoplastic Pipe and Fittings                  |
| ASTM F 477  | (2008) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe   |
| ASTM F 656  | (2008) Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings                          |

DUCTILE IRON PIPE RESEARCH ASSOCIATION (DIPRA)

|           |  |
|-----------|--|
| DIPRA TRD | (2002) Thrust Restraint Design for Ductile Iron Pipe |
|-----------|--|

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

|           |   |
|-----------|---|
| MSS SP-25 | (2008) Standard Marking System for Valves, Fittings, Flanges and Unions           |
| MSS SP-58 | (2002) Standard for Pipe Hangers and Supports - Materials, Design and Manufacture |
| MSS SP-69 | (2003; R 2004) Standard for Pipe Hangers and Supports - Selection and Application |
| MSS SP-89 | (2003) Pipe Hangers and Supports - Fabrication and Installation Practices         |

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

|          |  |
|----------|--|
| NFPA 70  | (2008; AMD 1 2008) National Electrical Code - 2008 Edition               |
| NFPA 704 | (2006) Identification of the Hazards of Materials for Emergency Response |

PLASTICS PIPE INSTITUTE (PPI)

|           |  |
|-----------|--|
| PPI TR-21 | (2001) Thermal Expansion and Contraction in Plastic Piping Systems |
|-----------|--|

## **1.4 SUBMITTALS**

The following shall be submitted:

Product Data: Manufacturer's descriptive and technical literature for each piping system, including design recommendations; pressure and temperature ratings; dimensions, type, grade and strength of pipe and fittings; thermal characteristics (coefficient of expansion and thermal conductivity); and chemical resistance to each chemical and chemical mixture in the liquid stream.

Material safety data sheet in conformance with 29 CFR 1910 Section 1200(g) for each chemical (solvents, solvent cements, and glues) delivered for use in pipe installation.

Test Reports: Pipe Leakage Tests, Hydrostatic Tests, Valve Testing, Disinfection

As-built drawings: Show pipe anchors and guides, and layout of piping systems relative to other parts of the work including clearances for maintenance and operation. As-built piping and instrumentation diagrams (P&IDs) identifying and labeling equipment, instrumentation, valves, vents, drains, and all other inline devices; The P&IDs found in the contract drawings shall be revised to reflect the constructed process system, as directed by the Contracting Officer.

## **1.5 DELIVERY, STORAGE, AND HANDLING**

Materials delivered and placed in storage shall be stored with protection from the weather, excessive humidity variation, excessive temperature variation, dirt, dust and/or other contaminants. Proper protection and care of material before, during and after installation is the Contractor's responsibility. Any material found to be damaged shall be replaced at the Contractor's expense. During installation, piping shall be capped to keep out dirt and other foreign matter. A material safety data sheet in conformance with 29 CFR 1910 Section 1200(g) shall accompany each chemical delivered for use in pipe installation. At a minimum, this includes all solvents, solvent cements, glues and other materials that may contain hazardous compounds. Handling shall be in accordance with ASTM F 402. Storage facilities shall be classified and marked in accordance with NFPA 704. Materials shall be stored with protection from puncture, dirt, grease, moisture, mechanical abrasions, excessive heat, ultraviolet (UV) radiation damage, or other damage. Pipe and fittings shall be handled and stored in accordance with the manufacturer's recommendation. Plastic pipe shall be packed, packaged and marked in accordance with ASTM D 3892.

## **1.6 SEQUENCING AND SCHEDULING**

For slab, floor, wall, and roof penetrations, keep on site pertinent wall pipes and sleeves before they are required for placement in concrete forms. Verify and coordinate the size and location of building and structure pipe penetrations before forming and placing concrete.

## **1.7 MAINTENANCE**

### **1.7.1 Service**

Services for automatic valve systems shall be provided by a manufacturer's representative who is experienced in the installation, adjustment and operation of the equipment specified. The representative shall inspect the installation, and supervise the adjustment and testing of the equipment.

### **1.7.2 Extra Materials**

Concurrent with delivery and installation of the specified piping systems and appurtenances, spare parts for each different item of material and equipment specified that is recommended by the manufacturer to be replaced any time up to 3 years of service shall be furnished.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS AND EQUIPMENT, IN GENERAL**

Provide piping materials and appurtenances as specified and as shown on the drawings, and suitable for the service intended. Piping materials, appurtenances, and equipment supplied as part of this contract shall be of equal material and ratings as the connecting pipe, new and unused except for testing equipment. Components that serve the same function and are the same size shall be identical products of the same manufacturer. The general materials to be used for the piping systems shall be in accordance with the Pipe Schedule and contract drawings. Pipe fittings shall be compatible with the applicable pipe materials.

The pressure ratings and materials specified represent minimum acceptable standards for piping systems. The piping systems shall be suitable for the services specified and intended. Each piping system shall be coordinated to function as a unit. Flanges, valves, fittings and appurtenances shall have a pressure rating no less than that required for the system in which they are installed.

Piping systems shall be suitable for design conditions, considering the piping both with and without internal pressure, and installation factors such as insulation, support spans, and ambient temperatures. Consideration shall be given to all operating and service conditions both internal and external to the piping systems.

#### **2.1.1 Standard Products**

Provide material and equipment which are the standard products of a manufacturer regularly engaged in the manufacturing of the products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Nominal sizes for standardized products shall be used. Pipe, valves, fittings and appurtenances shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

#### **2.1.2 Identification and Tagging**

Each piece of pipe shall bear the ASTM designation and all other markings required for that designation. Valves shall be marked in accordance with MSS SP-25 and shall bear an identification tag securely attached using plastic straps designed for that purpose. Identification tags shall be 1.375 inch minimum diameter, made of engraved laminated plastic. The service, valve identification number shown on the Valve Schedule and in the contract drawings, the manufacturer's name, and the valve model number shall be displayed.

### **2.2 DUCTILE IRON PIPING SYSTEM**

#### **2.2.1 Ductile Iron Pipe**

Ductile iron pipe for pressure service shall be Class 52 and shall have a design and wall thickness conforming to AWWA C150/A21.50. Ductile iron pipe shall have a standard cement mortar lining conforming to AWWA C104/A21.4.

#### **2.2.2 Ductile Iron Joints**

Joints shall have a working pressure rating for liquids equal to the pressure rating of the connected pipe. Dielectric fittings or isolation joints shall be provided between all dissimilar metals.

##### **2.2.2.1 Mechanical Joints**

All underground DIP shall have mechanical joints. Mechanical joints shall conform to AWWA C110/A21.10 and AWWA C111/A21.11. Gaskets, glands, bolts and nuts shall be furnished in sufficient quantity for the complete assembly of each mechanical joint. Glands shall be ductile iron with an asphaltic coating. Gaskets shall be vulcanized synthetic rubber, reclaimed rubber is not acceptable. Bolts and nuts shall be heat treated carbon steel, ASTM A 183, minimum tensile 110,000 psi. Mechanical joints shall have bolt holes oriented straddling the vertical centerline of the valves and fittings

#### 2.2.2.2 Flanged Joints

All above ground DIP shall have flanged joints and shall conform to AWWA C110/A21.10. Gaskets, bolts and nuts shall be provided with flanged joints in sufficient quantity for the complete assembly of each joint. Gaskets shall be vulcanized synthetic rubber, reclaimed rubber is not acceptable.

#### 2.2.3 Ductile Iron Fittings

Fittings shall be gray iron ASTM A 48/A 48M or ductile iron AWWA C110/A21.10. Up to 12 inches inclusive, the fittings shall be 250 psig rated. Gray iron fittings shall be cement mortar lined standard thickness. Flanges and flanged fittings shall conform to AWWA C110/A21.10 and shall be rated for 250 psig service. Materials shall be ductile iron. For tie-in to existing flanges, field check existing flanges for nonstandard bolt hole configurations and design as required to assure new pipe and flange mate properly. Bolts and nuts shall be carbon steel conforming to ASTM A 307, Grade B. Bolts shall be provided with washers of the same material as the bolts. Gaskets shall be rubber ring or full face, maximum 0.125 inch thick.

### **2.3 PLASTIC PIPING SYSTEM**

#### 2.3.1 PVC Pipe

All above ground PVC pressure piping shall be PVC, ASTM D 1784, Schedule 80 conforming to ASTM D 1785. All non-pressure PVC piping shall be SDR17 or SDR40.

#### 2.3.3 PVC Joints

The piping system shall be joined by flanged or mechanical connections except where connecting to unions, valves, and equipment with threaded connections that may require future disassembly. Connections at those points shall be threaded and back-welded. Tubing connections shall use compression fittings.

#### 2.3.4 PVC Fittings

The schedule rating for the fittings shall not be less than that for the associated pipe.

#### 2.3.5 PVC Solvent Cement

Socket connections shall be joined with PVC solvent cement conforming to ASTM D 2564. Manufacture and viscosity shall be as recommended by the pipe and fitting manufacturer to assure compatibility.

### **2.4 POLYETHYLENE TUBING SYSTEM**

#### 2.4.1 PE Tubing

Tubing shall be flexible low-density PE conforming to ASTM D 3350, and dimensioned in accordance with ASTM D 2737 with nominal size ½-inch.

## 2.4.2 Tubing Fittings

Fittings shall be compression type.

## 2.5 ISOLATION JOINTS AND COUPLINGS

### 2.5.1 Dielectric Fittings

Dielectric fittings shall be provided between threaded ferrous and nonferrous metallic pipe, fittings and valves. Dielectric fittings shall prevent metal-to-metal contact of dissimilar metallic piping elements and shall be suitable for the required working pressure, temperature and corrosive application.

### 2.5.2 Isolation Joints

Isolation joints shall be provided between nonthreaded ferrous and nonferrous metallic pipe fittings and valves. Isolation joints shall consist of an isolation gasket of the dielectric type, isolation washers and isolation sleeves for flange bolts. Isolation gaskets shall be full faced with an outside diameter equal to the flange outside diameter. Bolt isolation sleeves shall be full length. Units shall be of a shape to prevent metal-to-metal contact of dissimilar metallic piping elements.

### 2.5.3 Metallic Piping Couplings

Thrust ties shall be provided where shown on the contract drawings and where required to restrain the force developed by 1.5 times the maximum allowable operating pressures specified. For metallic pipe other than ductile iron, thrust ties shall be attached with fabricated lugs. For ductile iron pipe, thrust ties shall be attached with socket clamps against a grooved joint coupling or flange. For exposed installations, zinc-plated nuts and bolts shall be used. However, high-strength, low-alloy steel, in accordance with AWWA C111/A21.11, may be substituted for use on cast iron and ductile iron couplings. For buried and submerged installations, TP304 stainless steel bolts and nuts shall be provided. Steel middle rings and followers shall be fusion bonded epoxy-lined and coated in accordance with Section 09 90 00 Paints and Coatings and pressure tested beyond yield point.

#### 2.5.3.1 Sleeve-Type Couplings

Sleeve-type couplings shall be used for joining plain end pipe sections in a flexible manner with a diameter to properly fit the pipe. A coupling shall consist of one steel middle ring, two steel followers, two elastomeric wedge section gaskets and elliptic-neck, track-head steel bolts designed to properly compress the gaskets. For pipe sizes between 0.5 through 1.5 inch, the followers shall be ductile iron, and the middle ring shall be in accordance with ASTM A 513 with AWWA C111/A21.11 bolting. For pipe sizes 2 inch and larger, the followers shall be ASTM A 395/A 395M, and the middle ring shall be ASTM A 513 with AWWA C111/A21.11 bolting. Gaskets shall be ethylene propylene diene monomer (EPDM)] or as recommended by the manufacturer.

#### 2.5.3.2 Transition Couplings

Transitional couplings may be used to connect two pipes of the same material that have small differences in outside diameter. A fully assembled transitional coupling shall be sized to properly fit pipe diameters. The coupling shall consist of one ductile iron middle ring, two ductile iron followers, two elastomeric section gaskets and elliptic-neck, track-head steel bolts designed to properly compress the gaskets. The coupling shall use ethylene propylene diene monomer (EPDM)] gaskets or as recommended by the manufacturer. The coupling shall be sized to match the associated piping.

#### 2.5.3.3 Flanged Coupling Adapters

Flanged coupling adapters shall be fully assembled units manufactured to meet ASTM A 126 Class B, cast iron. The flanges shall mate with ASME B16.1 flanges of the same nominal size. A factory applied corrosion resistant coating shall be applied. The coupling shall use ethylene propylene diene monomer (EPDM) gaskets or as recommended by the manufacturer. Where pipe movement out of the adaptor may occur, proper anchorage of the pipe shall be provided. The coupling shall be sized to match the associated piping.

#### 2.5.4 Couplings for Nonmetallic Piping

##### 2.5.4.1 Bellows Coupling

A bellows coupling shall have a minimum of two polytetrafluoroethylene (PTFE) convolutions unless otherwise shown, with ductile iron flanged, faced and drilled to ASME B16.1 end connections, and metal reinforcing bands. The maximum allowable working pressure shall be 140 psig at 120 degrees F. Bolting shall be limited to restrain the force developed by 1.5 times the specified maximum allowable operating pressure. The coupling shall be sized to match the associated piping.

##### 2.5.4.2 Compression Coupling

A compression coupling shall consist of one steel middle section, two steel mechanical nuts, two elastomeric gaskets and two machined steel lock rings. The coupling shall use ethylene propylene diene monomer (EPDM) gaskets or as recommended by the manufacturer. . The maximum allowable working pressure shall be 150 psig at 120 degrees F. The coupling shall be sized to match the associated piping.

## 2.6 VALVES

#### 2.6.1 General Requirements for Valves

Valves shall include operator, actuator, handwheel, chain wheel, extension stem, floor stand, worm and gear operator, operating nut, chain, wrench, and all other accessories required for a complete operation. The valves shall be suitable for the intended service. Renewable parts are not to be of a lower quality than those specified. [Valves shall be the same size as adjoining pipe]. Valve ends shall be compatible with adjacent piping system. An operator shall be sized to operate the associated valve for the full range of pressures and velocities. Valves will open by turning counterclockwise. Operators, actuators, and accessories shall be factory mounted.

#### 2.6.2 Factory Finishing

Valves shall have an epoxy lining and coating in accordance with AWWA C550 unless otherwise specified. The epoxy shall be either a two-part liquid material or a heat-activated (fusion) material except that only a heat-activated material shall apply if a valve coating is specified as "fusion" or "fusion bonded" epoxy. The epoxy lining and coating shall have a minimum 7.0 mils dry film thickness except where it is limited by valve operating tolerances. Exposed valves shall be finished in accordance with Section 09 90 00 "Paints and Coatings".

#### 2.6.3 Check Valves

2.6.3.1 Swing Check Valves: Swing check valves, 2 inch through 36 inch, shall conform to AWWA C508, and have ASME B16.1 flanged end connections. Valves shall have a cast iron body, bronze-mounted disc, solid bronze hinges, and a stainless steel hinge shaft. Valves 2 inch through 12 inch shall be rated for 175 psig service and valves 14 through 36 inch shall be rated for 150 psig service at 140 degrees F. Valves shall be fitted with an adjustable outside lever and spring. An increasing-pattern body valve may be used where increased outlet piping size is shown.



2.6.3.2 Ball Check Valve: Ball check valves, 1 inch and larger, shall be in accordance with ASME B16.11, threaded ends, and cast iron bodies with a cleanout and floating type hollow steel ball. Flanges shall be ASME B16.1 Class 125. Valves shall be rated for 100 psig service and shall be suitable for vertical or horizontal flow.

2.6.4 Ball Valves, General Purpose: General purpose ball valves shall conform to the following:

Ball valves, 2 inch and smaller, shall be end entry type with bronze bodies and threaded, in accordance with ASME B1.20.1, regular ports. Valves shall have polytetrafluoroethylene (PTFE) seats and packing, brass balls hand lever operators. Valves shall be rated for 150 psig service at 150 degrees F. A union shall be installed adjacent to the valves to provide access to the seat.

2.6.5 Gate Valves, General Service: General service gate valves shall conform to the following:

Gate valves, 2.5 inch and larger, shall have Ni-resistant cast-iron bodies with iron trim. Valves shall meet the requirements of AWWA C500 and have Class 125 flanged end connections. Bonnet shall be a clamp type. Discs shall be wedge type of ductile iron construction, and have nonrising stems. Each gate valve, 16 inch and larger, shall include a by-pass of the same materials as the gate valve. The bypass shall meet the requirements of AWWA C500. Valves shall be rated for 200 psig service. Valves shall be equipped with handwheel operators.

2.6.6 Butterfly Valves, Standard Service

Butterfly valves, 2 inch and larger, shall have carbon steel bodies, lugged styled with ASME B16.1 flanged. Valves shall conform to AWWA C504 Class 125. Discs shall be contoured ASTM A 436 Type 1 Ni-resist cast iron with maximum lead content of 0.003 percent. The valve shafts shall be stainless steel with self-lubricating, corrosion-resistant sleeve type bearings. Valve seats for 24 inch and smaller valves shall be attached to either the valve body or the disc and shall be constructed of chloroprene. Valves shall have hand wheel or chain wheel operators.

2.6.7 Operators

Manual Operator: The force in a manual operator shall not exceed 39.3 pounds under any operating condition, including initial breakaway. The operator shall be equipped with gear reduction when force exceeds 39.3 pounds. The manual operator shall be a self-locking type or shall be equipped with a self-locking device. A position indicator shall be supplied on quarter-turn valves. Worm and gear operators shall be a one-piece design with worm-gears of gear bronze material. Worm shall be hardened alloy steel with the thread ground and polished. Traveling nut type operators shall have threader steel reach rods with an internally threaded bronze or ductile iron nut.

Exposed Operators: Exposed operators shall have galvanized and painted handwheels. Lever operators are allowed on quarter-turn valves 8 inch and smaller. Cranks shall be supplied on gear type operators. If located off of the operator floor, chain wheel operator with tiebacks, extension stem, floor stands, and other accessories shall be provided to permit operation from normal operation level. Valve handles shall be capable of padlocking, and wheels shall be lockable with a chain and padlock.

2.6.8 Valve Accessories

2.6.8.1 Chain Wheel and Guide

A chain wheel and guide shall be the handwheel direct-mount type, complete with galvanized chain on valves located higher than 6 feet.

## **2.7 DRAINS**

Valved drains may not be shown on the detailed drawings for individual pipelines; their absence will not relieve the Contractor of the responsibility for providing and installing them as indicated in the piping and instrumentation diagrams to complete the piping system for the use intended.

### **2.7.1 Locations**

All pipeline low points shall be drained.

### **2.7.2 Sizes**

For pipelines 2.5 inch and larger, drains shall be 0.75 inch and equipped with ball valves. For pipelines 2 inch and smaller, drains shall be 1/2 inch and equipped with ball valves.

## **2.8 SAMPLE PORTS**

Sample ports, shown on the flow diagrams and piping and instrument diagrams of the contract drawings, may not be shown on the detailed drawings of the individual pipelines; their absence shall not relieve the Contractor of the responsibility for providing them. Sample ports shall be provided as indicated in the piping and instrument diagrams to complete the piping systems for the use intended. The sample ports shall be located in easily accessible locations, and shall avoid potential stagnant points and/or areas where material could collect.

## **2.9 MISCELLANEOUS PIPING COMPONENTS**

### **2.9.1 Air Release**

Air release vents shall be located, and vented, such that a hazardous atmosphere will not be created upon operation. Air release shall be located as indicated on the contract drawings and at all high points.

### **2.9.2 Indicating Devices**

Instrumentation and Indicating Devices such as pressure gauges are located in Section 40 95 00 "Instrumentation and Process Control".

### **2.9.3 Expansion Joints**

Provide all structural work and equipment required to control expansion and contraction of piping. Verify that the anchors, guides, and expansion joints provided, adequately protect the piping systems. Provide expansion joints for ductile iron piping at connections to equipment as shown on the drawings.

### **2.9.4 Rupture Discs**

Rupture discs shall be as indicated in contract drawings. Discs shall be as supplied by the liquid phase GAC system supplier.

### **2.9.5 Pressure Reducing Valve**

The pressure reducing valve shall be 6-inches with 8-inch flanges as manufactured by Cla-val company (or equal), with model #: 694-01BCDSVKC. The valve shall be epoxy coated, Ductile with Stainless Internal Trim, 150-lb flange, rated for a flow of 1,000 gpm, and a pressure reduction from 130 psi to 30 psi, Opening and Closing speed Controls, and Position Indicator (X101);

## **2.10 PIPE SUPPORTS AND PENETRATIONS**

Provide auxiliary steel where the support of piping systems and equipment is required between building structural elements. Light gauge and structural steel shapes shall conform to the requirements of ASTM A 36/A 36M. The Contractor has the option to use pre-engineered support systems of electrogalvanized steel products. However, a mixture of support system manufacturers products is not permitted. Where auxiliary steel is indicated as stainless steel, provide TP304 stainless steel conforming to ASTM A 167, No. 1 Finish.

### **2.10.1 Pipe Supports**

Pipe supports shall conform to the requirements of MSS SP-58, MSS SP-69, and MSS SP-89. Where pipe supports contact bare piping or in-line devices, provide supports of compatible material so that neither shall have a deteriorating action on the other. The absence of pipe supports and details on the Contract Drawings does not relieve the Contractor of responsibility for sizing and providing supports throughout the facility.

#### **2.10.1.1 Beam Clamps**

For upper attachments on structural steel, provide beam clamps of ASTM A 36/A 36M carbon steel and MSS SP-58 Types 19 through 23, 25 or 27 through 30. Holes drilled in structural steel for hanger support rods will not be permitted. Clamps shall be provided with hardened steel cup-point set screws and lock-nuts for anchoring in place. Clamp size selection shall only be based on the support of the required load.

#### **2.10.1.2 Riser Clamps**

Vertical runs of piping shall be supported at each floor, or closer where required, with ASTM A 36/A 36M carbon steel clamps bolted around pipes and attached to the building construction. Two bolt-type clamps designed for installation under insulation shall be used on insulated pipe runs.

#### **2.10.1.3 Brackets**

Where piping is run adjacent to walls or steel columns, provide welded ASTM A 36/A 36M steel brackets, pre-punched with a minimum of two fastener holes.

#### **2.10.1.4 Offset Pipe Clamp**

Where pipes are indicated as offset from wall surfaces, supply a double-leg design two-piece pipe clamp.

#### **2.10.1.5 Racks**

Multiple pipe racks or trapeze hangers shall be fabricated from ASTM A 36/A 36M steel, and designed to suit the conditions at the points of installation. Pipes shall be kept in their relative positions to each other by the use of clamps or clips. Pipelines subject to thermal expansion must be free to slide or roll.

#### **2.10.1.6 Hangers**

Hangers shall be fabricated of ASTM A 36/A 36M carbon steel. All hangers shall be of a uniform type and material for a given pipe run and application. Coated or plated hangers shall be used to isolate steel hangers from dissimilar metal tube or pipe. Hangers for pipe sizes 2.5 inch or larger shall incorporate a means of vertical adjustment after erection while supporting the load. For piping systems with liquid temperatures up to 122 degrees F the following shall be used: MSS SP-58

Types 1,3 through 12, Types 24 and 26 with overhead support, or Types 35 through 38 with support from below.

#### 2.10.1.7 Hanger Rods

Hanger rods shall be carbon steel conforming to ASTM A 576. The diameter of the rods for piping system support shall conform to ASME B31.1.

### 2.10.2 Wall Penetrations

#### 2.10.2.1 Above Grade Wall Penetrations

Piping which passes through fire-rated or smoke-rated walls, floors, or ceilings shall be provided with insulated and encased pipe sleeves. Penetrations through an existing fire or fire barrier wall shall be sealed with a fire stop system that has an "F" rating not less than the required fire resistance rating of the penetrated wall. The fire stopping sealant for metal piping systems shall be a water based, vibration resistant, polysiloxane (also known as silicone) based, non-slumping, premixed sealant with intumescent properties, that is rated for 3 hours pursuant to ASTM E 814 and UL requirements. The fire stopping sealant for plastic and insulated piping systems shall be a polysiloxane (also known as silicone) based, non-slumping, premixed sealant with intumescent properties that is vibration and moisture resistant, and is rated for 3 hours pursuant to ASTM E 814 and UL requirements with metal collars. Vented plastic pipe penetrations shall be fitted with galvanized steel collars that have intumescent inlays.

#### 2.10.2.2 Below-Grade Wall Penetrations

Below-grade wall penetrations shall be provided with hydrostatic seals designed to seal opening between pipe or conduit and a through-structure opening. The seals shall be polysiloxane (also known as silicone) based, non-slumping, vibration and water resistant sealant with intumescent properties.

#### 2.10.2.3 Galvanizing

Galvanizing shall be hot-dip applied and meet the requirements of ASTM A 153/A 153M. Stainless steel components may be substituted where galvanizing is specified.

## 2.11 MISCELLANEOUS MATERIALS

### 2.11.1 Pipe Insulation Material

Not applicable.

## PART 3 – EXECUTION

### 3.1 EXAMINATION

After becoming familiar with all details of the work, verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

### 3.2 PREPARATION

#### 3.2.1 Protection

Pipe and equipment openings shall be closed with caps or plugs during installation. Equipment shall be protected from dirt, water, and chemical or mechanical damage.

### 3.2.2 System Preparation

#### 3.2.2.1 Pipe and Fittings

Pipe and fittings shall be inspected before exposed piping is installed or buried piping is lowered into the trench. Clean the ends of pipes thoroughly, remove foreign matter and dirt from inside of pipes, and keep piping clean during and after laying.

#### 3.2.2.2 Damaged Coatings

Repair damaged coating areas in the field with material equal to the original coating, except for damaged glass-lined pipe which shall be promptly removed from the site. Do not install damaged piping materials. Field repair of damaged and uncoated areas of galvanized piping shall conform to ASTM A 780/A 780M.

#### 3.2.2.3 Field Fabrication

Notify the Contracting Officer at least 2 weeks prior to the field fabrication of pipe or fittings and at least 3 days prior to the start of any surface preparation or coating application work. Fabrication of fittings shall be performed in accordance with the manufacturer's instructions.

## 3.3 EXPOSED PIPING INSTALLATION

Exposed piping shall be run as straight as practical along the alignment shown on the contract drawings and with a minimum of joints. Piping and appurtenances shall be installed in conformance with reviewed shop drawings, manufacturer's instructions and ASME B31.3. Piping shall be installed without springing or forcing the pipe.

### 3.3.1 Anchors and Fasteners

Impact expansion (hammer and explosive charge drive-type) anchors and fastener systems are not acceptable. Lead shields, plastic or fiber inserts, and drilled-in plastic sleeve/nail drive systems are also not acceptable.

### 3.3.2 Piping Expansion and Contraction Provisions

The piping shall be installed to allow for thermal expansion and contraction resulting from the difference between installation and operating temperatures. Design for installation of plastic pipe exposed to ambient conditions or in which the temperature variation of the contents is substantial shall have provisions for movement due to thermal expansion and contraction documented to be in accordance with PPI TR-21. Anchors shall be installed as shown in the contract drawings to withstand expansion thrust loads and to direct and control thermal expansion. An intermediate pipe guide shall be installed for every pipe at each metal channel framing support not carrying an anchor or alignment guide. Where pipe expansion joints are required, pipe alignment guides shall be installed adjacent to the expansion device and within four pipe diameters. Expansion devices shall be installed in accordance with the manufacturer's instructions and at the locations shown in the contract drawings.

### 3.3.3 Piping Flexibility Provisions

Thrust protection shall be provided as required. Flexible couplings and expansion joints shall be installed at connections to equipment, and where shown on the contract drawings. Additional pipe anchors and flexible couplings beyond those shown on the contract drawings, shall be provided to facilitate piping installation, in accordance with reviewed shop drawings.

### 3.3.4 Couplings, Adapters and Service Saddles

Pipes shall be thoroughly cleaned of oil, scale, rust, and dirt in order to provide a clean seat for gaskets. Gaskets shall be wiped clean prior to installation. Flexible couplings and flanged coupling adapter gaskets shall be lubricated with the manufacturer's standard lubricant before installation on the pipe ends. Couplings, service saddles, and anchor studs shall be installed in accordance with manufacturer's instructions. Bolts shall be tightened progressively, drawing up bolts on opposite sides a little at a time until all bolts have a uniform tightness. Torque-limiting wrenches shall be used to tighten bolts.

### 3.3.5 Piping Equipment/Component Installation

Piping components and indicators shall be installed in accordance with manufacturer's instructions. Required upstream and downstream clearances, isolation valves, and miscellaneous devices shall be provided for an operable installation. The upstream and downstream lengths of undisturbed piping shall be in accordance with flow indicator manufacturer's recommendations.

Local Indicators: All direct-reading indicator devices and pressure gauges shall be installed so that they can be easily read from floor level, and are readily accessible for maintenance and service. Pressure gauges and shall be installed where indicated in the contract drawings. Differential pressure gauges shall be installed across the process equipment indicated in the contract drawings, in accordance with the manufacturer's recommendations, and arranged for easy observation.

### 3.3.6 Pipe Flanges

Pipe flanges shall be set level, plumb, and aligned. Flanged fittings shall be installed true and perpendicular to the axis of the pipe. The bolt holes shall be concentric to the centerline of the pipe and shall straddle the vertical centerline of the pipe.

### 3.3.7 Valve Locations

Valves shall be located in accordance with the contract drawings where actuators are shown. Where actuators are not shown, valves shall be located and oriented to permit easy access to the valve operator, and to avoid interferences.

### 3.3.8 Pipe Tap Connections

Taps to pipe barrels are unacceptable. Taps to ductile iron piping shall be made only with a service saddle or at a tapping boss of a fitting, valve body, or equipment casting. Taps to steel piping shall be made only with a welded threadolet connection.

### 3.3.9 Plastic Pipe Installation

All plastic pipe shall be cut, made up, and installed in accordance with the pipe manufacturer's recommendations. Heat joining shall be performed in accordance with ASTM D 2657. Electrofusion joining shall be performed in accordance with ASTM F 1290. Schedule 40 pipe shall not be threaded. Schedule 80 threaded nipples shall be used where necessary to connect to threaded valves or fittings. Strap wrenches shall be used for tightening threaded plastic joints, and care shall be taken not to over tighten these fittings. Pipe shall not be laid when the temperature is below 40.1 degrees F nor above 90 degrees F when exposed to direct sunlight. Any plastic pipe installed above grade and outdoors shall be ultraviolet (UV) protected or UV resistant. The pipe ends that are to be joined shall be shielded from direct sunlight prior to and during the laying operation. Adequate ventilation shall be provided when working with pipe joint solvent cement and the handling of solvent cements, primers and cleaners shall be in accordance with ASTM F 402. Provide and install supports and hangers in accordance with the manufacturer's recommendations. All lines shall be hydrostatically tested at the maximum operating pressures.

#### 3.3.9.1 PVC Piping

Solvent-cemented joints shall be constructed in accordance with ASTM D 2855.

#### 3.3.10 Insulation

Insulation shall be installed on piping as indicated in accordance with the provisions of Section 22 07 19 "Plumbing Piping Insulation".

### **3.4 BURIED PIPE PLACEMENT**

#### 3.4.1 Location of Water Lines

Connect underground water main piping to the process piping lines where the process lines have been installed per the contract drawings

#### 3.4.2 Pipe Laying and Jointing

Install pipe and fittings in accordance with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Do not under any circumstances drop or dump pipe, fittings, valves, or any other water line material into trenches. Cut pipe in a neat workmanlike manner accurately to length established at the site and work into place without springing or forcing. Replace by one of the proper length any pipe or fitting that does not allow sufficient space for proper installation of jointing material. Blocking or wedging between bells and spigots will not be permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at proper elevation and grade. Secure firm, uniform support. Wood support blocking will not be permitted. Lay pipe so that the full length of each section of pipe and each fitting will rest solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports [where indicated and] where necessary for fastening work into place. Make proper provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been properly made. At the end of each work day, close open ends of pipe temporarily with wood blocks or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Depth of cover over top of pipe shall not be less than 3 1/2 feet.

#### 3.4.3 Connections to Existing Water Lines

Make connections to existing water lines after approval is obtained and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in coordination with and in accordance with the standard practices of Aqua New York.

The Contractor shall be responsible for the verification of existing piping and penetrations. Prior to ordering materials, expose all existing pipes which are to be connected to new pipelines. Verify the size, material, joint types, elevation, horizontal location, and pipe service of existing pipes, and inspect size and location of structure penetrations to verify adequacy of wall sleeves, and other openings before installing connecting pipes.

#### 3.4.4 Flanged Pipe

Flanged pipe shall only be installed above ground or with the flanges in valve pits.

#### 3.4.5 Installation of Ductile-Iron Piping, Specific

- a. Jointing: Make push-on, mechanical, or flanged joints with the gaskets, bolts, and nuts specified for this type joint. Make joints tight; avoid undue strain on flanges, fittings, valves,

and other equipment and accessories. Align bolt holes for each flanged joint. Use full size bolts for the bolt holes; use of undersized bolts to make up for misalignment of bolt holes or for any other purpose will not be permitted. Do not allow adjoining flange faces to be out of parallel to such degree that the flanged joint cannot be made watertight without overstraining the flange. When flanged pipe or fitting has dimensions that do not allow the making of a proper flanged joint as specified, replace it by one of proper dimensions, use screwed flanges to make flanged joints where conditions prevent the use of full-length flanged pipe and assemble in accordance with the recommendations of the screwed flange manufacturer. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer. Assemble in accordance with the recommendations of the coupling manufacturer. Groove pipe in the field only with approved groove cutting equipment designed especially for the purpose and produced by a manufacturer of grooved joint couplings; secure approval for field-cut grooves before assembling the joint. Make insulating joints with the gaskets, sleeves, washers, bolts, and nuts previously specified for this type joint. Assemble insulating joints as specified for flanged joints, except that bolts with insulating sleeves shall be full size for the bolt holes. Ensure that there is no metal-to-metal contact between dissimilar metals after the joint has been assembled.

- b. Allowable Deflection: The maximum allowable deflection shall be as given in AWWA C600. If the alignment requires deflection in excess of the above limitations, special bends or a sufficient number of shorter lengths of pipe shall be furnished to provide angular deflections within the limit set forth.
- c. Pipe Anchorage: Provide concrete thrust blocks (reaction backing) and metal harness for pipe anchorage. Thrust blocks shall be in accordance with the requirements of AWWA C600 for thrust restraint, except that size and positioning of thrust blocks shall be as indicated. Use concrete, ASTM C 94/C 94M, having a minimum compressive strength of 2,500 psi at 28 days; or use concrete of a mix not leaner than one part cement, 2 1/2 parts sand, and 5 parts gravel, having the same minimum compressive strength. Metal harness shall be in accordance with the requirements of AWWA C600 for thrust restraint, using tie rods and clamps except as otherwise indicated.
- d. Exterior Protection: Completely encase buried ductile iron pipelines with polyethylene tube or sheet, using Class A polyethylene film, in accordance with AWWA C105/A21.5.

### **3.5 CONNECTING DISSIMILAR PIPE**

Flexible transition couplings, dielectric fittings and isolation joints shall be installed in accordance with the manufacturer's instructions.

### **3.6 EXTERNAL CORROSION PROTECTION**

Protect all pipe and piping accessories from corrosion and adverse environmental conditions.

#### **3.6.1 Above Grade Metallic Piping**

Nonferrous and stainless steel piping shall not be painted except for aluminum alloy piping. Where dissimilar metals are joined, isolation joints shall be used.

##### **3.6.1.1 Ferrous Piping**

Shop primed surfaces shall be touched up with ferrous metal primer. Surfaces that have not been shop primed shall be solvent cleaned. Surfaces that contain loose rust, mill scale or other foreign substances shall be mechanically cleaned by power wire brushing and primed with a ferrous metal primer. Primed



surfaces shall be finished with two coats of exterior vinyl paint in accordance with Section 09 90 00 Paints and Coatings”.

### **3.7 FLEXIBLE JOINTS AT CONCRETE STRUCTURES**

Flexible joints shall be provided at the face of all structures, whether or not shown on the contract drawings. Rubber ring joints, mechanical joints, flexible couplings, and proprietary restrained ductile iron pipe joints shall be considered flexible joints; welded pipe joints shall not. Joints may be flush with the structure face or may be located up to 1 pipe diameter away from face, but not further than 17.7 inches away from face. For pipelines larger than 18 inch in diameter the first joint shall be within 1 pipe diameter.

### **3.8 CLOSURES**

Closure pieces shall be installed as necessary to end pipe runs and shall conform to ASME B16.9 or ASME B16.11. Elastomer sleeves bonded to pipe ends are not acceptable. Pressure piping shall have closures of blind flanges, unless otherwise shown on contract drawings or approved by the Contracting Officer. Pipes with restrained joints shall have pipe closures installed with thrust tie-rod assemblies.

### **3.9 PENETRATIONS**

Steel pipe sleeves shall be hot-dipped galvanized after fabrication for above grade applications in non-submerged areas. For below grade, or in submerged and damp environments, steel pipe sleeves shall be lined and coated as specified in Section 09 90 00 Paints and Coatings. Embedded metallic piping shall be isolated from concrete reinforcement using coated pipe penetrations. Coatings shall be as specified in Section 09 90 00 Paints and Coatings. Wall pipes shall be securely supported by form work to prevent contact with reinforcing steel and tie-wires. Joints shall be caulked with rubber sealant or sealed with a wall penetration seal. For existing concrete walls, rotary drilled holes may be provided in lieu of sleeves.

### **3.10 VALVE INSTALLATION**

Flanged valve bolt holes shall be installed so as to straddle the vertical centerline of pipe. Flanged faces shall be cleaned prior to inserting the gasket and bolts, and then the nuts shall be tightened progressively and uniformly. Threaded ends shall have the threads cleaned by wire brushing or swabbing prior to installation.

#### **3.10.1 Valve Orientation**

The operating stem of a manual valve shall be installed in a vertical position when the valve is installed in horizontal runs of pipe having centerline elevations 4.5 feet or less above finished floor, unless otherwise shown on contract drawings. The operating stem of a manual valve shall be installed in a horizontal position in horizontal runs of pipe having centerline elevations between 4.5 feet and 6.75 feet above finish floor, unless otherwise shown on contract drawings. Automatic valves shall be installed in accordance with the manufacturer's instructions.

##### **3.10.1.1 Butterfly Valves**

Orientation of butterfly valves shall take into account changes in pipe direction. Valve shafts shall be oriented so that unbalanced flows caused by pipe direction changes or other disturbances are equally divided to each half of the disc.

#### **3.10.2 Line Size Ball Valves**

A line size ball valve and union shall be installed upstream of each solenoid valve, in-line flow switch, or other in-line electrical device, excluding magnetic flow meters, for isolation during maintenance.

### 3.10.3 Chain Wheel and Guide

Chain wheel and guide assemblies or chain lever assemblies shall be installed on manually operated valves located over 6.73 feet above finished floor elevation. Where chains hang in normally traveled areas, appropriate "L" type tie-back anchors shall be used.

### 3.11 AIR RELEASE, DRAINS AND SAMPLE PORTS

Sample ports shall be provided where indicated on the contract drawings. Install specified vents at piping high points for entrapped air release and install drains in the low points of pipelines regardless of whether shown on contract drawings.

### 3.12 PIPING SUPPORT SYSTEMS INSTALLATION

The absence of pipe supports and details on the contract drawings shall not relieve the Contractor of responsibility for sizing and providing supports throughout plant.

#### 3.12.1 General Support Requirements

Pipe support systems shall meet the requirements of MSS SP-58. Contractor-designed and selected support systems shall be installed in accordance with MSS SP-69, and as specified herein. Piping connections to equipment shall be supported by pipe supports and not off the equipment. Large or heavy valves, fittings, and/or equipment shall be supported independently of associated piping. Pipes shall not be supported off other pipes. Supports shall be provided at piping changes in direction or in elevation, adjacent to flexible joints and couplings, and where otherwise shown on the contract drawings. Pipe supports and hangers shall not be installed in equipment access areas. Hanging pipes shall be braced against horizontal movement by both longitudinal and lateral sway bracing. At each channel type support, every pipe shall be provided with an intermediate pipe guide, except where pipe anchors are required. Existing support systems may be used to support additional new piping only if the Contractor can demonstrate that the existing support systems are adequate for the additional loads, or if the existing systems are strengthened to support the additional loads. Pedestal type pipe supports shall be provided under base flanges adjacent to rotating equipment and where required to isolate vibration. Piping 2.5 inch in diameter and larger shall be braced for seismic forces. Lateral supports for seismic loads shall be installed at all changes in direction.

#### 3.12.2 Support Methods

Piping support and spacing shall be provided as specified and as shown in the contract drawings, in addition to supplemental support as needed in the field. Single horizontal suspended piping shall be supported by adjustable swivel-ring hangers. Multiple horizontal suspended piping shall be supported by trapeze hangers with channel type supports. Horizontal pedestal mounted piping shall have saddle type supports. Horizontal wall mounted piping shall have wall brackets. Vertical piping shall be supported by wall brackets, base elbows, or riser clamps on floor penetrations.

### 3.13 PIPE IDENTIFICATION, PAINTING AND COLOR CODING

Color, coating, and lettering requirements for exposed piping shall be in accordance with Section 09 90 00 Paints and Coatings. A single individual band, of plastic adhesive tape or paint, designating pipe contents shall be provided with sufficient length to permit the stenciling of pipe contents in letters. Identification shall be provided at branch connections, inlets and outlets of equipment, every 19.7 feet of straight run, upstream of valves, and within 3.3 feet of entrance to or exit from wall curtains, or other similar type barrier.

### 3.14 FIELD QUALITY CONTROL

### 3.14.1 Hydrostatic Tests

Where any section of a pipeline is provided with concrete thrust blocking for fitting, the hydrostatic tests shall not be made until at least 5 days after the installation of the concrete thrust blocking, unless otherwise approved by the Contracting Officer.

#### 3.14.1.1 Exposed Piping

Hydrostatic testing shall be conducted in accordance with ASME B31.3. Piping systems shall be tested under normal service conditions (as indicated in the Pipe Schedule in the contract drawings) to demonstrate compliance. The test pressure shall not be less than 1.5 times the design pressure. Water shall be used as the hydrostatic test fluid. Provide clean test water of such quality to prevent corrosion of the piping system materials. Air release vents shall be opened at all high points of the piping system in order to purge air pockets while the piping system is filling.

#### 3.14.1.3 Time for Making Test

Except for joint material setting or where concrete thrust blocks necessitate a delay, underground piping jointed with rubber gaskets, mechanical or push-on joints, or couplings may be subjected to hydrostatic pressure, inspected, and tested for leakage at any time after partial completion of backfill. Tests for above ground pressure piping shall be conducted after the piping has been completely installed, including all supports, hangers, and anchors, and inspected for proper installation but prior to installation of insulation.

### 3.14.2 Pipe Leakage Tests

Unless approved by the Contracting Officer, leakage testing shall be conducted after the pressure tests have been satisfactorily completed. The duration of each leakage test shall be at least 2 hours, and during the test the piping shall be subjected to not less than 200 psig pressure. Leakage is defined as the quantity of the test liquid, water that is supplied to the piping system, or any valved or approved section thereof, in order to maintain pressure within 5 psi of the specified leakage test pressure after the piping has been filled with the test liquid and all air is expelled. No piping installation will be accepted if leakage exceeds the allowable leakage determined by the following formula:

$$L = C_f \times N \times D \times P^{0.5}$$

C<sub>f</sub> = conversion factor = 0.0001351  
L = allowable leakage, gallons per hour  
N = number of joints in the length of piping tested  
D = nominal pipe diameter, inches  
P = average test pressure during the test, psig.

Should any test disclose leakage greater than that allowed, the leaks shall be located and repaired until the leakage is within the specified allowance, without additional cost.

#### 3.14.3 Testing New to Existing Connections

New piping connected to existing pipe, existing equipment, existing treatment systems, or tanks and treatment systems furnished under other Sections shall be tested. Isolate the new piping with pipe caps, spectacle blinds, or blind flanges. The joint between new piping and existing piping shall be tested by methods that do not place the entire existing system under the test load. Proceed then, with the testing of new piping systems as specified herein.

#### 3.14.4 Valve Testing

Valves may either be tested while testing pipelines, or as a separate step. It shall be demonstrated that valves open and close smoothly with operating pressure on one side and atmospheric pressure on the

other, and in both directions for two-way valve applications. Count and record the number of turns required to open and close each valve, and account for any discrepancies with manufacturer's data. Air and vacuum relief valves shall be examined as the associated pipe is being filled to verify venting and seating is fully functional. Set, verify, and record set pressures for all relief and regulating valves. Self-contained automatic valves shall be tested at both maximum and minimum operating ranges, and reset upon completion of test to the design value.

### **3.15 FINAL CLEANING**

#### **3.15.1 Interim Cleaning**

Prevent the accumulation of weld rod, weld spatter, pipe cuttings and filings, gravel, cleaning rags, and other foreign material within piping sections during fabrication. The piping shall be examined to assure removal of these and other foreign objects prior to assembly and installation.

#### **3.15.2 Flushing**

Following assembly and testing, and prior to final acceptance, piping systems shall be flushed with water to remove accumulated construction debris and other foreign matter. The piping shall be flushed until all foreign matter is removed from the pipeline. Provide all hoses, temporary pipes, ditches, and other items as required to properly dispose of flushing water without damage to adjacent properties. The minimum flushing velocity shall be 2.5 fps. For large diameter pipe where it is impractical to flush the pipe at the minimum flushing velocity, the pipeline shall be cleaned in-place from the inside by brushing and sweeping, then flushing the pipeline at a lower velocity. Cone strainers shall be installed in the flushing connections of attached equipment and left in place until cleaning is completed. Accumulated debris shall be removed through drains, or by removing spools or valves.

#### **3.16.3 Disinfection**

Before acceptance of piping system operation, each section of completed pipeline shall be disinfected in accordance with AWWA C651. After pressure tests have been made, the piping section to be disinfected shall be thoroughly flushed with water until all entrained dirt and mud have been removed before introducing the chlorinating material. The chlorinating material shall be sodium hypochlorite. The chlorinating material shall provide a dosage of not less than 50 ppm and shall be introduced into the piping in an approved manner. PVC pipe lines shall be chlorinated using only the above specified chlorinating material in solution. In no case shall the agent be introduced into the line in a dry solid state. The treated water shall be retained in the pipe long enough to destroy all non-spore-forming bacteria. Except where a shorter period is approved, the retention time shall be at least 24 hours and shall produce not less than 25 ppm of free chlorine residual throughout the line at the end of the retention period. All valves on the lines being disinfected shall be opened and closed several times during the contact period. The line shall then be flushed with clean water until the residual chlorine is reduced to less than 1.0 ppm. During the flushing period, each outlet on the line shall be opened and closed several times. From several points in the pipeline section, Contractor personnel, approved by the Contracting Officer, shall take samples in sterilized containers and have a bacterial examination performed by a commercial laboratory in accordance with state approved methods. The commercial laboratory must be certified by the state's approving authority for examination of potable water. The disinfection shall be repeated until the piping system passes the bacterial examination for 2 consecutive days. The piping system will not be accepted until satisfactory bacteriological results have been obtained.

### **3.16 WASTE WATER DISPOSAL**

The water used for testing, cleaning, flushing and/or disinfection shall be disposed of in accordance with all applicable regulations. Disposal is solely the responsibility of the Contractor. The method proposed for disposal of waste water shall be provided to, and approved by, the Contracting Officer prior to performing any testing, cleaning, flushing and disinfection activities.

### **3.17 MANUFACTURERS' FIELD SERVICES**

Obtain manufacturer's technical assistance for Contractor training, installation inspection, start up, and owner operating and maintenance training. Follow manufacturer's instructions for installation.

END OF SECTION

## SECTION 40 95 00

### INSTRUMENTATION AND PROCESS CONTROL

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK (SYSTEM DESCRIPTION)

Furnish instrumentation as specified and as shown on the Construction Drawings. All instrumentation shall be consistent and compatible with existing systems. This includes local wiring, connections to process pipe, and other accessories required for the instrumentation and controls to safely and accurately operate.

##### 1.2 SUBMITTALS

Product Data: Manufacturer's descriptive and technical literature, data sheets, performance charts and installation instructions. Product specific catalog cuts shall be in booklet form, indexed to the unique identifiers, and shall consist of data sheets that document compliance with the specification. Where multiple components are shown on a catalog cut, the application specific component shall be marked.

#### PART 2 – PRODUCTS

##### 2.1 MATERIALS AND EQUIPMENT

###### 2.1.1 Standard Products

Materials and equipment shall be standard unmodified products of a manufacturer regularly engaged in the manufacturing of such products. Units of the same type of equipment shall be products of a single manufacturer. Items of the same type and purpose shall be identical and supplied by the same manufacturer, unless replaced by a new version approved by the Government.

1. All instrumentation shall be consistent and compatible with the existing system.
2. All instrumentation supplied shall be of the Manufacturers' latest design and shall produce or be activated by signals which are established standards for the water industry.
3. All electronic instrumentation, if used, shall be of the solid-state type and shall utilize linear transmission signals of 4 to 20 MA (milli-amperes direct current).
4. All instruments shall be provided with the Manufacturers' standard mounting hardware.
5. All indicators or recorder readouts if used shall be linear in process units.
6. Electronic equipment shall be suitably coated to prevent contamination by dust, moisture and fungus. Solid state components shall be conservatively rated for their purpose, to assure optimum long-term performance and dependability over ambient atmosphere fluctuations and to 100 percent relative humidity. The field mounted equipment and system components shall be designed for installation in dusty, humid, and outdoor environment.

###### 2.1.2 Nameplates

Each major component of equipment shall have the manufacturer's name and address, and the model and serial number in a conspicuous place.

## 2.2 GENERAL REQUIREMENTS

1. All analog transmitter and controller outputs shall be 4 to 20 mA into a load of 0 to 750 ohms, unless specifically noted otherwise.
2. All equipment shall be designed and constructed so that in the event of a power interruption, the equipment specified hereunder shall resume normal operation without manual resetting when power is restored.
3. Enclosures shall be per NEMA 4X.
4. Unless specified otherwise, all instruments must be consistent with the similar, existing instruments located at this facility.

## 2.3 MONITORING INSTRUMENTATION

### 2.3.1 Flow Sensor & Transmitter

Turbine flow meter suitable for 8" pipe size along with accompanying fittings. Following are the details:

|                   |  |
|-------------------|--|
| Type:             | Turbine; Direct Read Manual  |
| Construction:     | Meets or exceeds all sections of Standard ANSI/AWWA C701 Class II, most recent revision for cold water turbine meters with AWWA bronze main cases. |
| Design/Operation: | Velocity Type Flow measurement; Turbine Type   |
| Pressure          | 175 PSI @68° F   |
| Temperature       | 0-150 ° F.   |
| Flow range        | 500 to 1,200 gpm   |
| Size:             | 6-inch   |
| End Connection:   | Flange   |
| Manufacturer:     | McMaster-Carr (Item Number 4189K13) or equal   |

### 2.3.2 Pressure Instrumentation

#### 2.3.2.1 Pressure Gauge

The pressure gauge shall be liquid filled bourdon tube type. The pressure gauge shall indicate the pressure entering and exiting each GAC adsorber and shall measure in psi gage with a range, plus or minus 10 percent of design range and shall be furnished with display to the nearest 1 psi and shall have a range of 0 to 150 psi The pressure gauges shall have 4 1/2" face diameter with a stainless steel bourdon tube in a phenolic case housing.

#### 2.3.3.2 Wet/Wet Differential Pressure

One differential pressure transmitter to monitor differential pressure across all GAC units.

|                    |                    |
|--------------------|--------------------|
| Type:              | Differential Gauge |
| Mounting Location: | Bottom             |
| Construction:      | Aluminum           |
| Dial Size:         | 4.5 inch           |

O-Rings/Diaphragm: Buna-N  
Accuracy: +/- 2%  
Differential Pressure: 0-25 psid  
Working Pressure: 200 psig or higher  
Process connection: 1/4" Female NPT  
Model & Manufacturer: Ashcroft Type 1131 (or equal)  
Liquid Filled: Glycerin

## **2.4 COMPRESSED AIR STATIONS**

NONE

## **2.5 PROGRAMMABLE LOGIC CONTROLLER (PLC)**

NOT USED

## **2.6 CONTROL PANELS**

None

## **PART 3 – EXECUTION**

### **3.1 EQUIPMENT INSTALLATION REQUIREMENTS**

#### **3.1.1 Installation**

Install system components and appurtenances in accordance with the manufacturer's instructions and shall provide necessary interconnections, services, and adjustments required for a complete and operable system. Adjust or replace devices not conforming to the required accuracies. Factory sealed devices shall be replaced (rather than adjusted). Devices shall be installed in accordance with manufacturers' recommendations and as shown.

### **3.2 SOFTWARE INSTALLATION**

NOT USED

### **3.3 MANUFACTURERS' FIELD SERVICES**

NOT USED

### **3.4 FIELD TRAINING**

NOT USED

END OF SECTION





## SECTION 43 31 13

### LIQUID PHASE GRANULAR ACTIVATED CARBON ADSORPTION SYSTEM

#### PART 1 – GENERAL

##### 1.1 SCOPE OF WORK (SECTION DESCRIPTION)

- A. Carbon Adsorption Hardware.
- B. Granular Activated Carbon (GAC).
- C. GAC System Supplier Services. Contractor shall utilize the services of the GAC system supplier as required during the installation, loading, startup, testing, and backwashing of the GAC units during operation.
- D. Furnish all labor, materials, equipment and incidentals required to install the GAC System. This Section specifies the performance requirements for the design, fabrication, installation, and operation of the GAC system as shown on the contract drawings and as specified. The adsorption system consists of three carbon units and all related appurtenances required for an operational system.
- E. Procurement, rigging, installation, carbon filling, startup, and disinfection of a temporary GAC system.

##### 1.2 REFERENCES

- A. ASME Section VIII, Division 1 – American Society of Mechanical Engineers Boiler and Pressure Vessel Code.
- B. ASME/ANSI B16.5 – American Society of Mechanical Engineers/American National Standard Institute.
- C. U.S. Food and Drug Administration, 21 CFR 175.300 and 177.2420.
- D. Steel Structures Painting Council Surface preparation Specifications and National Association of Corrosion Engineers.
- E. ASME Section II, American Society of Mechanical Engineers – Materials, Parts A, B & C.
- F. American Society of Testing Materials (ASTM).
- G. American Water Works Association (AWWA) – B604, Standard for Granular Activated Carbon.
- H. ANSI/NSF Standard Drinking Water System Components – Health Effects.

##### 1.3 SYSTEM DESCRIPTION

- A. GAC System Supplier shall furnish the Carbon Adsorption Systems described herein (for installation by the contractor). The complete adsorption system shall include the following:
  - 1. Carbon adsorbers with internals for carbon retention
  - 2. NSF Approved Activated Carbon
  - 3. Influent, effluent and backwash piping with valves

4. Carbon fill and discharge piping with valves
  5. Vent and pressure relief piping
  6. Water piping and utility connections
  7. Accessories as shown below
  8. Manufacturer's Services
- B. The vessels, piping valves, and carbon functions as a system and shall be the end products of GAC System Supplier to achieve standardization for appearance, operation, maintenance, spare parts, and manufacturer's services.
- C. There shall be three carbon adsorption systems as delineated below:

| System Number | Number of GAC vessels         | Unit Flow Rate GPM | Pressure Drop – Normal Operation PSI | Pressure Drop Backwash Operation PSI |
|---------------|-------------------------------|--------------------|--------------------------------------|--------------------------------------|
| 1             | Three individual carbon units | 700                | 7 – 10                               | 15                                   |

- D. Anticipated Inlet Characteristics

| Compound                | Units | Influent Concentration |
|-------------------------|-------|------------------------|
| Flow                    | gpm   | 700                    |
| pH                      | S.U.  | 4.9                    |
| Total Dissolved Solids  | mg/l  | 70                     |
| Trichloroethylene (TCE) | µg/l  | 10                     |
| Iron                    | mg/l  | 1.2                    |
| Copper                  | mg/l  | 0.05                   |
| Lead                    | µg/l  | 2.3                    |
| Total hardness          | mg/l  | 17                     |
| Calcium hardness        | mg/l  | 10                     |
| Sulfate                 | mg/l  | 22                     |
| Turbidity               | NTU   | 2.5                    |

- E. Outlet Characteristics

The GAC System shall be designed to meet the discharge limits given below:

| Discharge Parameter | Units | Limit |
|---------------------|-------|-------|
| Trichloroethylene   | µg/L  | <1    |
| Arsenic             | µg/L  | <5    |

#### 1.4 SUBMITTALS

- A. Adsorber vessel data sheet and drawing including design pressure, dimensions, and capacity.

- B. System flow diagram showing all valves, components, instrumentation and utilities.
- C. System general arrangement showing dimensions, weights, and elevations including influent, effluent, backwash, and carbon exchange pipe connection locations.
- D. Process flow diagrams and instrumentation diagrams(s) showing all major pieces of process equipment with controls (valves). Show on the drawings complete piping, wiring and schematic diagrams and any other details required to demonstrate that the system has been coordinated and shall properly function as a unit. Also show proposed layout and anchorage of equipment and appurtenances; equipment relationship to other parts of the work; clearances for maintenance and operation; and shop and erection details, including cuts, copes, connections, holes, bolts, and welds.
- E. Pressure drop information across the system. Demonstration of the total head loss through the carbon, adsorbers and appurtenant piping.
- F. Specification of the granular activated carbon to be utilized in the system. Iodine number; isotherm and column test data. Design calculations indicating removals of each of the listed compounds in the carbon bed. Reports of testing granular activated carbon in accordance with AWWA B604. Material safety data sheet in conformance with 29 CFR 1910 Section 1200(g) for activated carbon.
- G. Manufacturer's certificates, including the name and address of the production facility, attesting that the activated carbon furnished meets the specified requirements.
- H. Material specifications for pipe, fittings and instrumentation.
  - 1. Specifications for vessel lining.
  - 2. Specifications for vessel painting.
- I. System Operating & Maintenance Manual shall be provided prior to shipment of the system – 4 copies.

## **PART 2 – PRODUCTS**

### **2.1 MATERIALS AND EQUIPMENT**

Provide materials and equipment which are new and unused.

#### **2.1.1 Standard Products**

Provide materials and equipment which are the standard products of a manufacturer regularly engaged in the manufacture of the products and that essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Materials and equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

#### **2.1.2 Nameplates**

Adsorption shells shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

## 2.2 MEDIA

### 2.2.1 Activated Carbon

Material shall be NSF approved and free from impurities that affect the serviceability and appearance of the finished product. Activated carbon shall not require dosing or addition of a chemical mixture or solution to the water to be treated or to the water used for backwashing.

- A. Twenty thousand (20,000) pounds of GAC shall be provided and installed within each adsorber vessel (60,000 pounds total).
- B. The activated carbon shall be virgin, granular and manufactured from select grades of bituminous coal combined with suitable binders to provide a re-agglomerated granular product by a domestic (United States) manufacturing facility. Granules shall be clean and hard. The GAC shall conform to AWWA B604 (Potable Water Service) standard for GAC and comply with ANSI/NSF Standard 61. The activated carbon which is manufactured to the following specification:

|  |            |
|--|------------|
| Iodine Number, mg/g (minimum) (ASTM D 4607): | 900        |
| Moisture as packed, wt% (maximum):           | 2          |
| Abrasion Number (Ro-Tap), (minimum):         | 78         |
| Effective Size, mm:                          | 0.8 to 1.0 |
| Uniformity Coefficient, (maximum):           | 2.1        |
| Trace Capacity Number                        | 9          |

|  |    |
|--|----|
| U.S. Sieve Series                      |    |
| Percent Remaining on 8 mesh (maximum): | 15 |
| Percent Passing 30 mesh (maximum):     | 4  |

Typical Properties:

|                                       |      |
|---------------------------------------|------|
| Ash, wt%:                             | 8    |
| Apparent Density, g/cc (ASTM D 2854): | 0.56 |
| Water Soluble Ash, wt%:               | <1%  |
| Non-Wettable, wt%:                    | <1%  |

- C. An analysis sheet certifying compliance with the specifications, and indicating point of manufacture shall accompany the delivered activated carbon.

## 2.3 ADSORPTION BATTERY COMPONENTS

Adsorption battery shall consist of three units. Performance specified shall refer to each unit and not to the battery as a whole.

### 2.3.1 Head Loss

Head loss in each unit at rated flow shall not exceed 7 psig when filled with fresh media.

### 2.3.2 Adsorption Shell - Modular units

- A. The carbon adsorber vessels shall be Modular Carbon Adsorption System Vessels, as designed by GAC System Supplier, meeting these specifications. Modular units shall be acceptable under AWWA B605.

- B. The carbon adsorber vessels shall be fabricated of carbon steel, conforming to ASTM A516 grade 70, 10'-0" diameter by 12'-0" straight side height with 2:1 elliptical top and bottom heads. The vessels shall be designed, constructed and stamped in accordance with ASME Section VIII, Division 1 and registered with the National Board for a design pressure rating of 125 psig at 140 °F. Each vessel shall be provided with one (1) 20" diameter round manway located on the lower straight side portion of the vessel and one 14" x18" elliptical manway located on the bottom head. The vessels shall be free standing vessels with four (4) structural steel support legs.
- C. The structural aspects of the vessel shall be sufficient to meet the UBC requirements for seismic Zone 4. GAC System Supplier shall submit detailed calculations on request illustrating the seismic characteristics of the proposed vessel.
- D. Each vessel shall be equipped with an internal cone bottom (45° angle) underdrain system equipped with polypropylene (pp) underdrain nozzles to provide a minimum of one (1) nozzle for every nominal square foot of vessel cross section.
- E. All surfaces shall be degreased prior to sandblasting. The adsorber internal surface that will be lined shall be blasted to a white metal surface (SSPC-SP5) to provide a 3 to 4 mil anchor pattern. The exterior of the adsorber shall be power tool cleaned to the degree specified by SSPC-SP3-63.
- F. The interior surfaces of each vessel shall be lined with a nominal 35 to 45 mil dry film thickness (dft) using Carboline's Plasite 4110 series vinyl ester lining materials. The interior surfaces under the internal cone bottom shall also be lined with 10 to 12 mil dft using Carboline's Plasite "4000 series" vinyl ester lining materials. Plasite "4000 series" materials shall meet the requirements of the U. S. Federal Register, Food and Drug Regulations Title 21, Chapter 1, Paragraph 175.300.
- G. The exterior surface of the adsorbers shall be painted to a dry film thickness of 5 to 7 mil with an high solids epoxy (gray color) paint material using Sherwin Williams 646 Macropoxy or equal.
- H. Bolts and attaching hardware shall be stainless steel, conforming with ASTM F 593.

## **2.4 Process and Utility Piping**

- A. GAC system supplier shall be responsible to furnish three sets of GAC units and piping and valves for operating the units in parallel. Additionally, each of the units can be individually backwashed with treated water. One flow meter (with totalizer) shall be provided on each of the GAC feed lines to monitor flow and a differential pressure gauge shall be installed across the three units on the common manifold to measure the differential pressure across the three units.
- B. The process and utility piping on the adsorption system shall include influent water to the system, treated water, backwash supply and discharge, adsorber vent lines and granular activated carbon fill and discharge piping.
- C. Process piping (influent, effluent and backwash) shall be 8" diameter, constructed of schedule 40 carbon steel, ASTM A53 Grade B materials with 125# ASTM A126 Class B cast iron flanged fittings.
- D. Vent piping shall be 3" diameter, constructed of schedule 40 carbon steel, ASTM A53 Grade B materials.

- E. Carbon fill piping shall be 4" diameter, constructed of schedule 40 carbon steel, ASTM A53 Grade B materials.
- F. Carbon discharge piping shall be 4" diameter, constructed of schedule 40 polypropylene lined carbon steel, ASTM 53 Grade B materials with ppl lined flanged fittings.
- G. Utility piping shall be constructed of threaded schedule 80 carbon steel, ASTM 53 Grade B materials.
- H. All piping surfaces shall be power tool cleaned to the degree specified by SSPC-SP3-63.
- I. The exterior surface of the piping shall be painted to a dry film thickness of 5 to 7 mil with a high solids epoxy (gray color) paint material prior to assembly to ensure minimum oxidation at flanged connections.
- J. The piping network shall be provided with a structural steel support frame for support of the piping, valves, and flow meters module.

## **2.5 Valves**

- A. The process and utility piping; excluding GAC fill and discharge piping shall be equipped with butterfly valves for flow control. Each of the units shall have valves on the influent, effluent and backwash connections adequate to allow the unit to be taken out of service to backwash or change out the activated carbon in the unit without affecting the operation of the other units.
- B. The influent, effluent, and backwash control valves shall be a cast iron wafer type body butterfly valve with aluminum-bronze disc, BUNA-N seats and stainless steel shaft to mate to 150 pound ANSI flanges. The valves shall be rated for 200 psig in closed position at 180 °F, and meet or exceed section 5.0 of AWWA specification C-504-87.
- C. The carbon fill and discharge valves shall be 4" diameter full port ball valves, 316 stainless steel construction with TFE seats and seals. A total of four (4) valves shall be supplied, two (2) for carbon fill and two (2) for carbon discharge.
- D. Utility valves for the compressed air supply shall be bronze or brass or barstock brass body regular port ball valves.

## **2.6 Instrumentation**

- A. Pressure relief at each vessel shall be provided by a 3" rupture disk constructed of impervious graphite and designed to relieve pressure at the MAWP of the vessel. The rupture disks shall be mounted off the vessel vent line. A total of two (2) shall be provided for the system.

## **2.7 Miscellaneous**

- A. The carbon fill and discharge shall be fitted with hose connections, such that carbon transfer to and from the adsorbers can be facilitated using carbon transfer hoses. These connectors shall be 4" Quick Disconnect Adaptors constructed of corrosion resistant materials (nylon) as manufactured by Dover Corp. as Kamlock connectors or equal.
- B. Two (2) flush connections shall be provided on each GAC fill line, one upstream and one downstream of the valve. One (1) flush connection shall be provided on each GAC discharge line, downstream of the valve. The connections shall be welded into the steel or stainless steel pipe or screwed into solid propylene "spacers" for the lined pipe. Flush

connections shall consist of a short section of ¾" pipe, a ¾" full port ball valve and a ¾" quick disconnect adaptor to match with water hose fittings.

### **PART 3 – EXECUTION**

Work associated with a fully functional system including:

- A. Procurement, rigging, installation, carbon filling, startup, and disinfection.
- B. After installation of the GAC vessels, the contractor shall load (fill/transfer) each GAC vessel with virgin GAC. The contractor shall provide all related equipment for the carbon fill to each GAC unit including utilities such as air. Contractor shall be aware that there is **no** plant air available at the facility. Contractor shall assume that 10,000 gallons of water will be required per GAC unit for initially backwashing the carbon units for GAC segregation prior to placing the units in service.
- C. Disinfection of GAC using sodium hydroxide solution as required (See Paragraph 3.5 below).
- D. Disposal of waste during the startup and placement of the units in service including disinfection waste, backwash waste generated during backwash of the units to segregate the carbon prior to startup, and all other related wastes. This shall also include all disposal work including metering waste, neutralizing waste, and disposal of the wastewater to the sewer including any sampling.
- E. Services relates to testing of treated water and proving out GAC's effectiveness, related temporary storage tanks, sampling and analytical work.
- F. The units are expected to be in operation for seven months (spring-summer-fall). The Contractor shall also provide labor and equipment for periodic backwashing of units during its operation. Assume there will be four backwashes during the operation of the units.

#### **3.1 EXAMINATION**

After becoming familiar with all details of the work, verify all dimensions in the field, and advise the Contracting Officer of any discrepancy before performing the work.

#### **3.2 EQUIPMENT INSTALLATION**

Each adsorber shell or tank shall be anchored to a footing. Anchor bolts shall be provided to hold the shell to anchors in the footing.

#### **3.3 PAINTING**

All ferrous surfaces shall be coated or painted.

##### **3.3.1 Touch-Up Painting**

Factory painted items shall be touched up as needed. Factory painted items requiring touching up in the field shall be thoroughly cleaned of all foreign material, primed and top-coated with the manufacturer's standard factory finish.



### **3.4 TESTS**

All products shall be carefully inspected for defects in workmanship and material; debris and foreign matter shall be cleaned out of valve openings and seats; all operating mechanisms shall be operated to check their proper functioning; and all nuts and bolts shall be checked for tightness. Valves and other equipment which do not operate easily or are otherwise defective shall be repaired or replaced.

#### **3.4.1 Hydrostatic Tests**

After installation, all tanks shall be tested for water tightness. Testing plugs or caps, all necessary pressure pumps, pipe connections, gauges, other equipment, and all labor required shall be included. Test pressures shall be 125 psi for 1 hour. Piping systems shall be isolated from the tanks for pressure testing at the specified test pressures.

#### **3.4.2 Performance Tests**

An Operating Performance Test shall be performed to demonstrate that the completely installed Granular Activated Carbon Adsorber System conforms to the requirements of this specification. The performance test shall be performed for a few days which shall be determined at a later date. Field tests shall not be conducted until such time that the entire installation is complete and ready for testing. The services of an equipment Manufacturer's representative shall be furnished to supervise test runs of the equipment.

#### **3.4.3 Liquid Sampling and Analyses**

Influent and effluent samples shall be collected, marked, preserved and analyzed.

#### **3.4.3 Remedy**

If the Installation Inspection or Operating Performance Test reveals deficiencies, corrective measures shall be taken until the Granular Activated Carbon Adsorber System satisfies all of the specified requirements.

### **3.5 DISINFECTION PROCEDURE**

#### **3.5.1 Disinfection**

1. Take an adsorber off-line and make sure that a line on top of the adsorber is open to serve as a vent.
2. Drain the water from the adsorber through the adsorber effluent line.
3. Pump a 5% sodium hydroxide solution into the adsorber through the effluent line, the required volume is 7,000 gallons. See step 9a for an alternate procedure.
4. Stop pumping when the NaOH solution overflows through the vent line.
5. Allow the carbon to soak in the sodium hydroxide for at least four hours.
6. Drain NaOH solution from the adsorber through the adsorber effluent line.

### **3.5.2 Neutralization**

7. Wash carbon by adding contaminant-free or clean water through the effluent line for 7-10 hours at a flow of 1.3-3 gpm/ft<sup>2</sup> in order to wash out the residual sodium hydroxide and neutralize the carbon. The disinfection is then complete.
- 8a. An alternate, faster procedure for neutralizing the carbon includes acid treatment. After the sodium hydroxide solution is drained from the adsorber, pump 5 gallons of reagent grade hydrochloric acid (37% HCl) into the adsorber through the effluent line.
- 8b. Fill the adsorber with clean water by backfilling through the effluent line at 3-5 gpm/ ft<sup>2</sup> so as to thoroughly mix the content of the adsorber. Shut off the backfill water when it begins to overflow through the vent line.
- 8c. Allow the carbon to soak for 60 minutes, then drain the adsorber. Check the pH of the water, which should be in the range of 8 to 10.
- 8d. Wash the carbon by adding clean water through the effluent line at a rate of 1.3-3 gpm/ ft<sup>2</sup> until the pH of the effluent water matches the influent water or within desired pH range. Disinfection is then complete.

### **3.5.3 Alternate Disinfection Procedure**

- 9a. After step 2, add – 1,000 gallons of clear water through the effluent line.
- 9b. After completing step 9a, pump the contents of two 55-gallon drums of 50% sodium hydroxide into the adsorber through the effluent line.
- 9c. Fill the adsorber with clean water by backfilling through the effluent line at 3-5 gpm/ ft<sup>2</sup> so as to thoroughly mix the contents of the adsorber.
- 9d. Shut off the backfill water when it begins to overflow through the vent line. Check the pH of the water exiting the vent line. It should be 13 or higher.
- 9e. Go to step 5.

## **3.6 MANUFACTURER'S SERVICES**

Provide the services of a representative of the manufacturer who is experienced in the installation, adjustment, and operation of the equipment specified. The representative shall supervise the installing, adjusting, and testing of equipment.

## **3.7 FIELD TRAINING**

No field training is required.

## **3.8 OPTIONAL ACCESSORIES**

Provide three (3) 2" side sample nozzles at each vessel for use with in-bed water sample probes. Sample probes consist of a stainless steel pipe with a stainless steel slotted nozzle to collect a water sample from within the carbon bed. The sample probe shall be inserted through a 2" flanged nozzle (flanged nozzle to assure adequate coverage of the internal lining); and shall be provided with a drop line and shutoff valve external to the adsorber.

### **3.9 SAFETY MESSAGE**

Wet activated carbon preferentially removes oxygen from air. In closed or partially closed containers and vessels, oxygen depletion may reach hazardous levels. If workers are to enter a vessel containing carbon, appropriate sampling and work procedures for potentially low oxygen spaces should be followed, including all applicable Federal and State requirements.

END OF SECTION

APPENDIX D

# Tetra Tech NUS, Inc. Interim LPGAC System Design Drawings

---

# MODIFICATIONS TO AQUA NEW YORK, INC. WATER TREATMENT FACILITY INTERIM EMERGENCY SEAMANS NECK ROAD NASSAU COUNTY, NEW YORK

## DRAWING LIST

### GENERAL

G-1 COVER SHEET

### CIVIL

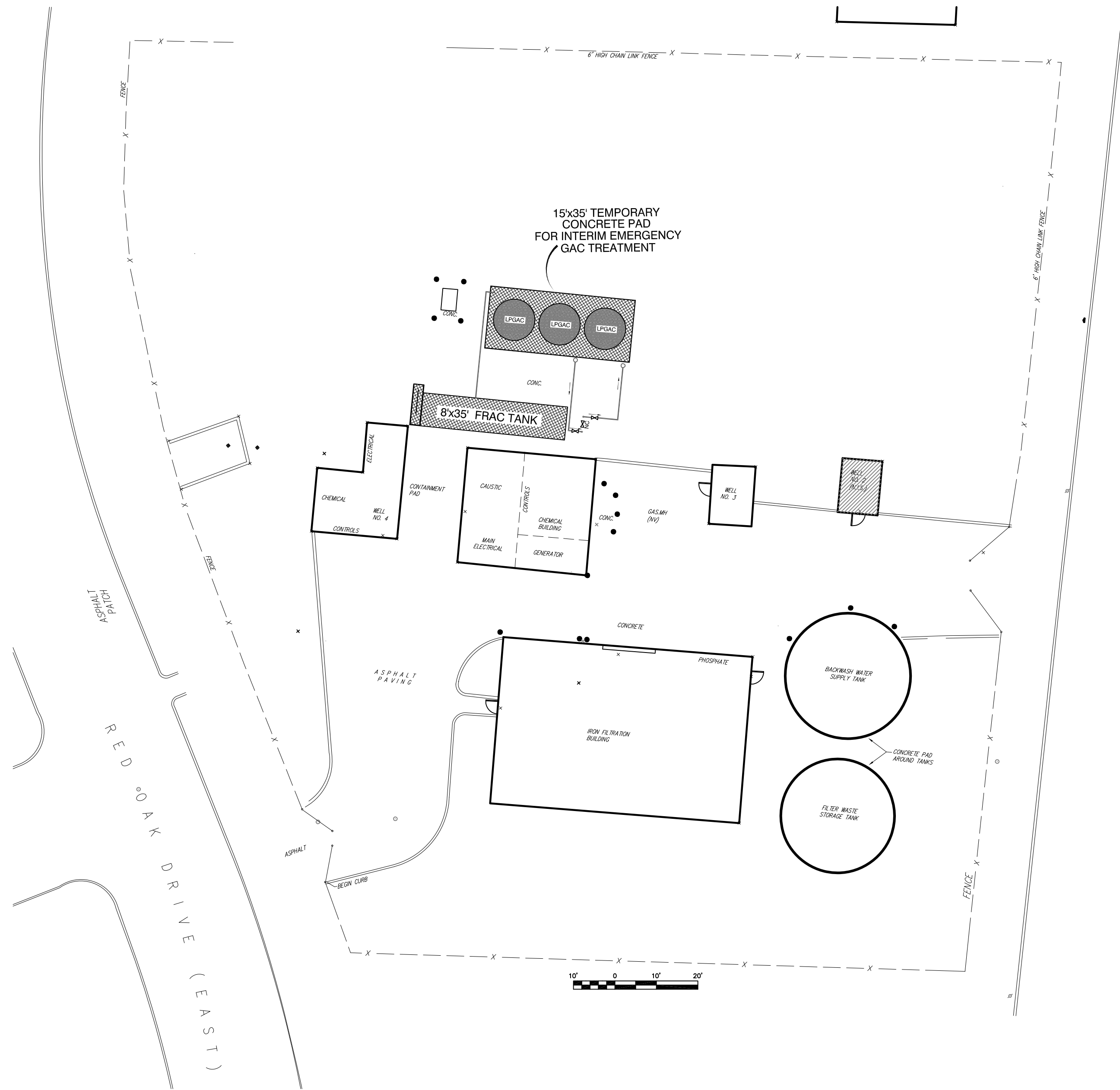
C-1 SITE PLAN  
C-2 LPGAC PAD LOCATION PLAN

### STRUCTURAL

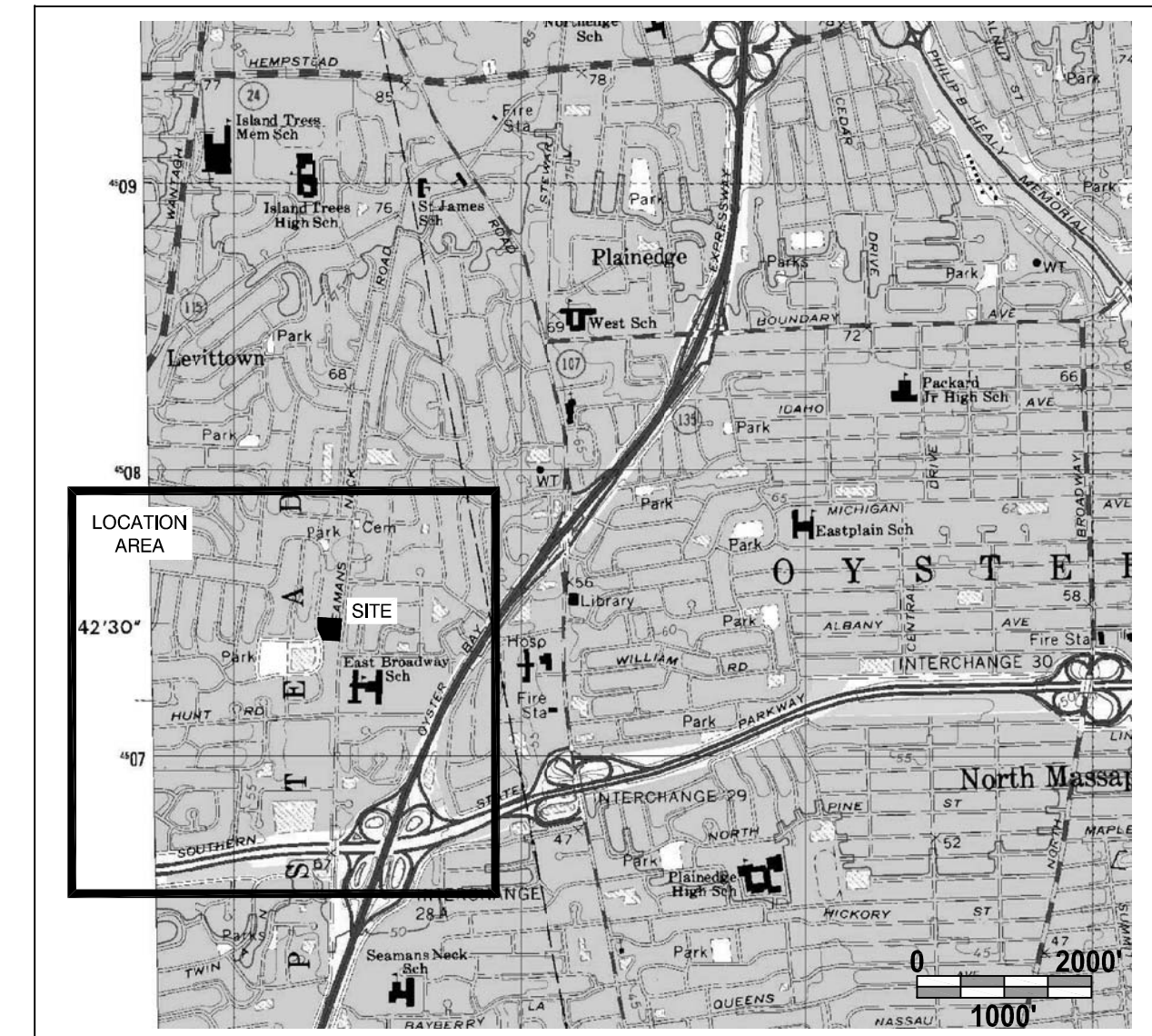
S-1 LPGAC CONCRETE PAD DETAILS

### PROCESS & MECHANICAL

PFD-1 PROCESS FLOW DIAGRAM  
PID-1 P&ID-EXISTING SYSTEM TIE-IN  
PID-2 P&ID  
M-1 PIPING LAYOUT - PLAN VIEW  
M-2 PIPING LAYOUT - ELEVATIONS



PROPERTY PLAN - 1"=20'



GENERAL VICINITY MAP - 1"=2000'  
SOURCE: USGS - AMITYVILLE, NY - 7.5 MINUTE QUADRANGLE - 1994

### SITE DATA:

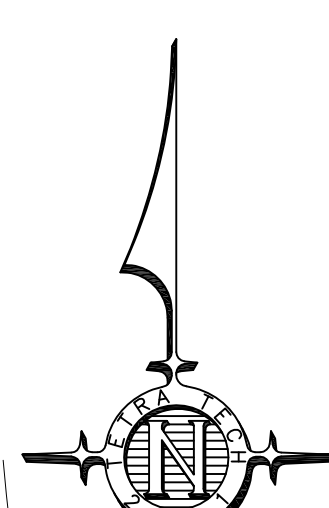
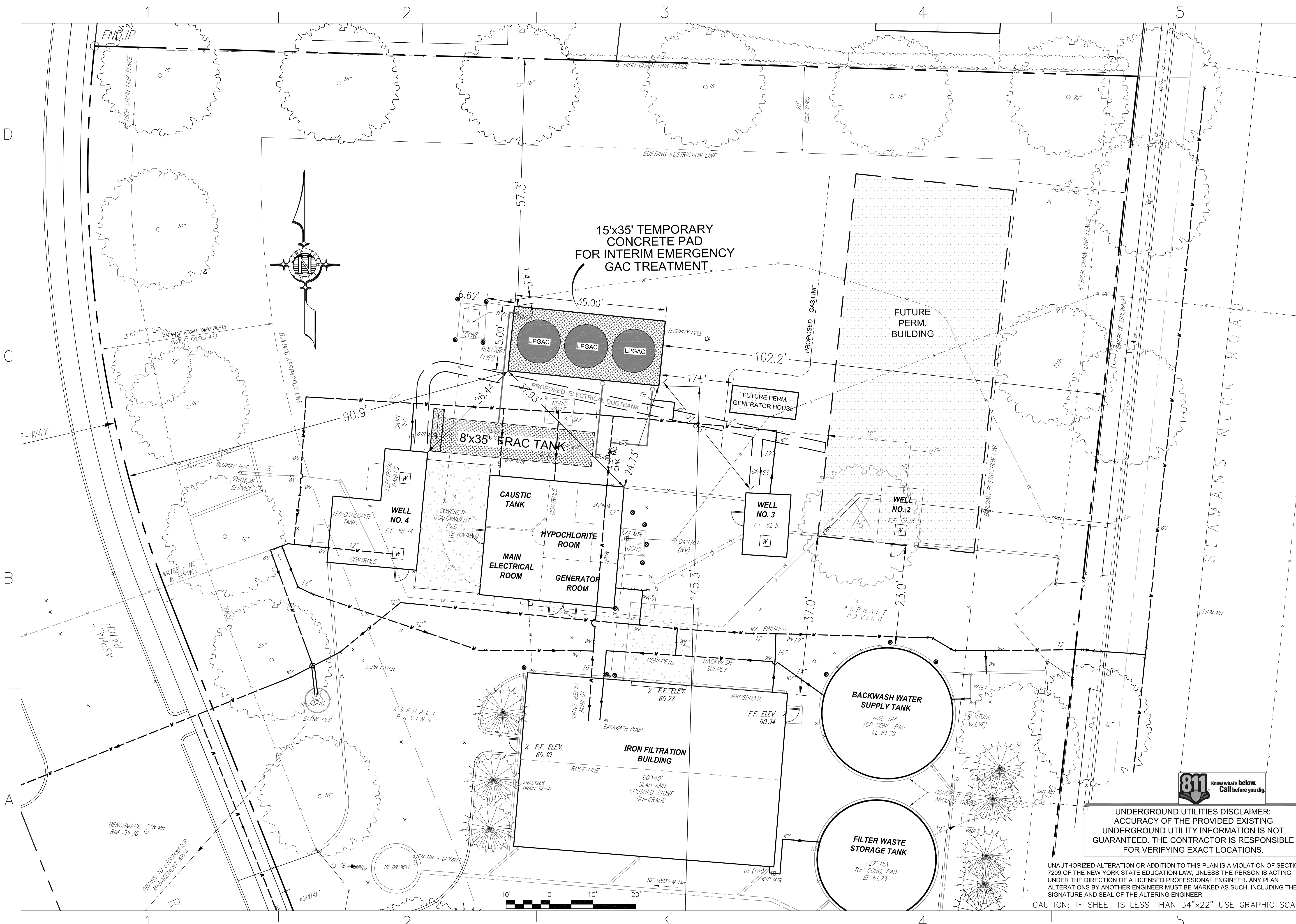
1. PREPARED FOR: UNITED STATES NAVY
2. OWNER: AQUA AMERICA - NEW YORK
3. PROPERTY ADDRESS: 670 SEAMANS NECK ROAD  
LEVITTOWN, N.Y. 11783  
TOWN OF HEMPSTEAD, NASSAU COUNTY, NEW YORK
4. TAX PARCEL NUMBER: BLOCK 403, SECTION 51, LOT 27  
(FORMERLY LOT 8. SUBDIVIDED INTO LOTS 25 & 27. LOT 25 WAS TAKEN FOR ROAD WIDENING)
5. SCHOOL DISTRICT: LEVITTOWN SCHOOL DISTRICT
6. SOURCE OF TITLE: DEED BOOK 4725, PAGES 33-36
7. PARCEL AREA: 1.0705± ACRES (CALCULATED PER DEED)
8. ZONING: LEVITTOWN PLANNED RESIDENCE DISTRICT (LPRD).
9. SETBACKS: FRONT YARD: AVERAGE FRONT YARD DEPTH  
SIDE YARD: 20 FEET (OTHER THAN SINGLE FAMILY RESIDENCE)  
REAR YARD: 25 FEET
10. TOPOGRAPHY: TOPOGRAPHY IS BASED ON A FIELD SURVEY PERFORMED BY TETRA TECH ON SEPTEMBER 26-27, 2009, AN.
11. DATUM: HORIZONTAL=DEED, VERTICAL=NASSAU COUNTY SANITARY SEWER.  
BENCHMARK: SANITARY MANHOLE AT RED OAK DRIVE, RIM = 55.36. PROJECT BENCHMARK F.H.#3041 TOP NUT = 58.46.
12. BOUNDARY: BOUNDARY LINES SHOWN HEREIN ARE BASED ON A FIELD SURVEY CONDUCTED ON MARCH 17, 2011, PHYSICAL FIELD EVIDENCE, AERIAL PHOTOGRAPHS, RECORD DEED 4725, PAGE 33, AND AVAILABLE PLANS AND WAS BEST FIT TO THE EXISTING CONDITIONS.
13. SANITARY SEWER: NASSAU COUNTY SEWAGE DISPOSAL DISTRICT NO. 3.
14. UTILITIES: UTILITIES ARE SHOWN ACCORDING TO FIELD SURVEYED FOUND SURFACE EVIDENCE AND BEST AVAILABLE PLANS. ALL UTILITIES ARE APPROXIMATE AND MUST BE VERIFIED PRIOR TO COMMENCING EXCAVATION OPERATIONS.
15. FEMA: THIS SITE IS LOCATED ON THE FEMA FIRM PANEL 36059C0253-G. THE PANEL IS LISTED AS "PANEL NOT PRINTED - NO SPECIAL FLOOD HAZARD AREAS" ON FEMA FIRM INDEX MAP NUMBER 36059CIND1-B.
16. REFERENCE PLANS: "MAP SHOWING REAL PROPERTY TO BE ACQUIRED FOR THE ALTERATION OF ALIGNMENT OF SEAMANS NECK ROAD", SHEET 5 OF 9, PREPARED BY BRUIN & KING, DATED AUGUST 1962.

UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ANY PLAN ALTERATIONS BY ANOTHER ENGINEER MUST BE MARKED AS SUCH, INCLUDING THE SIGNATURE AND SEAL OF THE ALTERING ENGINEER.

|   |   |
|---|---|
| SUBMITTED FOR: HMM<br>DATE: _____<br>DESCRIPTION: _____<br>SYM: _____ | NAVFAC<br><br>DEPARTMENT OF THE NAVY<br>NAVAL FACILITIES ENGINEERING COMMAND - MID-ATLANTIC<br>NAVAL STATION - NORFOLK, VIRGINIA<br>AQUA NY<br>NASSAU COUNTY, NEW YORK<br><b>MODIFICATIONS TO WATER TREATMENT FACILITY - INTERIM EMERGENCY</b><br>COVER SHEET |
| DES: HMM DR SNL<br>REVIEWED BY: HMM<br>FM/DM<br>CHIEF ENG/ARCH: HMM   | CODE ID. NO. 80091 SIZE D<br>SCALE: SEE INSET<br>MAXIMO NO. N62470-08-D-1001<br>JOB ORDER NO. WE-25<br>SPEC. NO.<br>CONSTR. CONTR. NO. 112G02019<br>NAVFAC DRAWING NO.<br>SHEET OF ---  |

CAUTION: IF SHEET IS LESS THAN 34"x22" USE GRAPHIC SCALE



**G-1**



**UNDERGROUND UTILITIES DISCLAIMER:**  
 ACCURACY OF THE PROVIDED EXISTING  
 UNDERGROUND UTILITY INFORMATION IS NOT  
 GUARANTEED. THE CONTRACTOR IS RESPONSIBLE  
 FOR VERIFYING EXACT LOCATIONS.

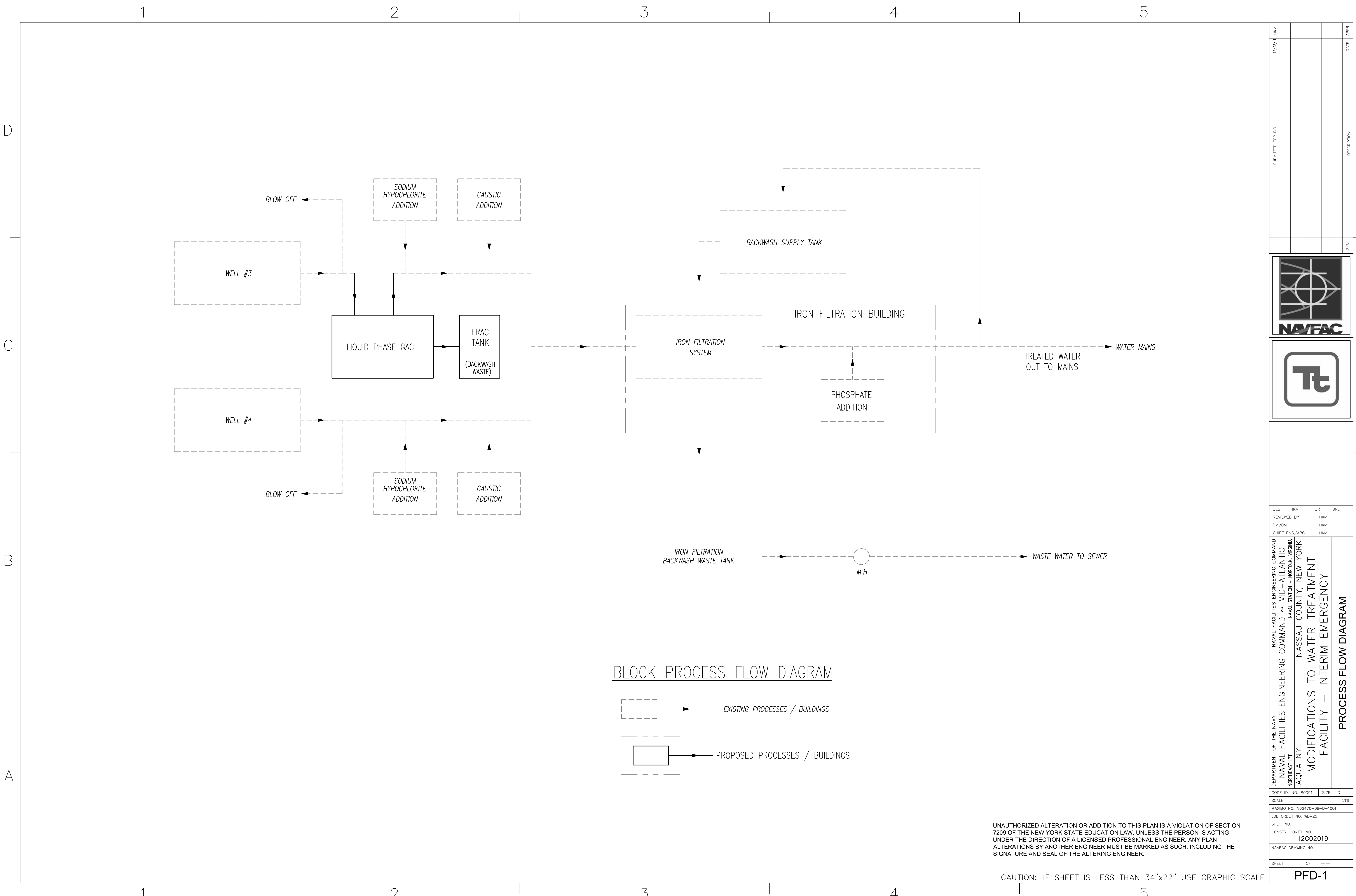
UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW. UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ANY PLAN ALTERATIONS BY ANOTHER ENGINEER MUST BE MARKED AS SUCH, INCLUDING THE SIGNATURE AND SEAL OF THE ALTERING ENGINEER.

CAUTION: IF SHEET IS LESS THAN 34"x22" USE GRAPHIC SCALE

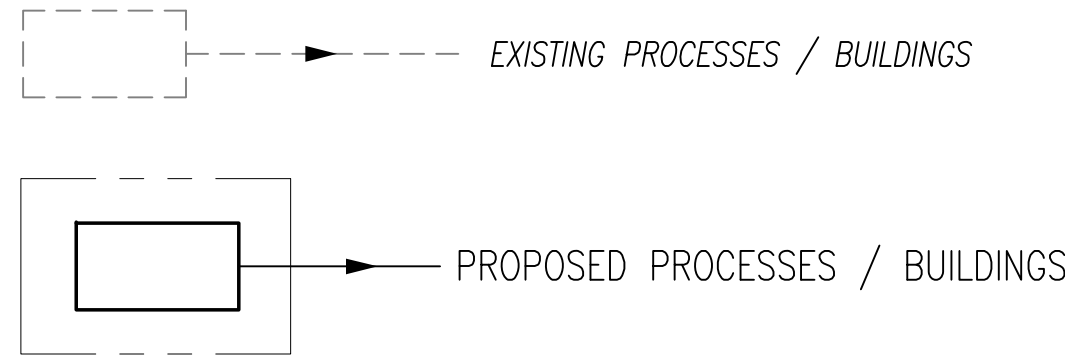
|   |                  |      |     |
|---|------------------|------|-----|
| 12/21/11  | HMM              |      |     |
| DATE  | BY               |      |     |
| SUBMITTED FOR BID   |                  |      |     |
| DESCRIPTION   |                  |      |     |
| SYM   |                  |      |     |
| <br>  |                  |      |     |
| DEPARTMENT OF THE NAVY<br>NAVAL FACILITIES ENGINEERING COMMAND ~ MID-ATLANTIC<br>NAVAL STATION - NORFOLK, VIRGINIA<br>NORTHEAST IFT<br>AQUA NY<br>NASSAU COUNTY, NEW YORK<br><b>MODIFICATIONS TO WATER TREATMENT FACILITY - INTERIM EMERGENCY</b><br><b>SITE PLAN</b> |                  |      |     |
| DES   | HMM              | DR   | SNL |
| REVIEWED BY   | HMM              |      |     |
| FM/DM   | HMM              |      |     |
| CHIEF ENG/ARCH  | HMM              |      |     |
| CODE ID. NO.  | 80091            | SIZE | D   |
| SCALE:  | 1"=10'-0"        |      |     |
| MAXIMO NO.  | N62470-08-D-1001 |      |     |
| JOB ORDER NO.   | WE-25            |      |     |
| SPEC. NO.   |                  |      |     |
| CONSTR. CONTR. NO.  | 112G02019        |      |     |
| NAVFAC DRAWING NO.  |                  |      |     |
| SHEET   | OF               | ---  |     |
| <b>C-1</b>  |                  |      |     |







BLOCK PROCESS FLOW DIAGRAM



UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ANY PLAN ALTERATIONS BY ANOTHER ENGINEER MUST BE MARKED AS SUCH, INCLUDING THE SIGNATURE AND SEAL OF THE ALTERING ENGINEER.

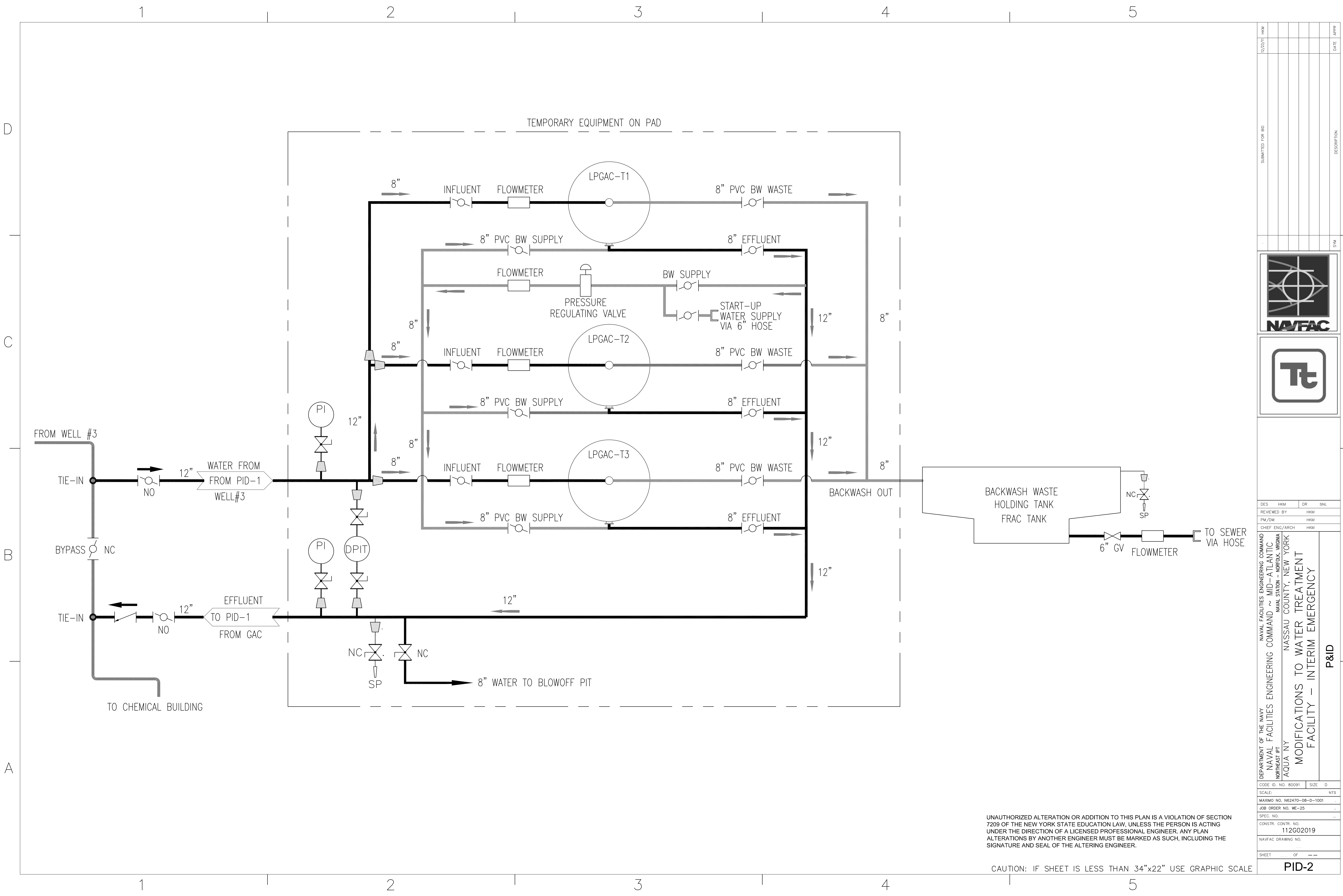
CAUTION: IF SHEET IS LESS THAN 34"x22" USE GRAPHIC SCALE

|   |  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
|---|--|-------------------|-------------|--------|-------------|-------------|-----------------------------|--|--|---------------------|-----|--|-----------|-------|----------|--------------------|-----------|--|--------------------|--|--|-------|----|-----|---------------------|
| <p>DEPARTMENT OF THE NAVY<br/>NAVAL FACILITIES ENGINEERING COMMAND<br/>NAVAL FACILITIES ENGINEERING COMMAND - MID-ATLANTIC<br/>NORTH/EAST IFT<br/>AQUA NY<br/>NAVAL STATION - NORFOLK, VIRGINIA<br/>NASSAU COUNTY, NEW YORK<br/>MODIFICATIONS TO WATER TREATMENT FACILITY - INTERIM EMERGENCY<br/>PROCESS FLOW DIAGRAM</p>  | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">SUBMITTED FOR BID</td> <td style="width: 10%;">DATE</td> <td style="width: 10%;">SYN</td> <td style="width: 10%;">DESCRIPTION</td> <td style="width: 10%;">DATE</td> <td style="width: 10%;">REPR</td> </tr> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </table>                       | SUBMITTED FOR BID | DATE        | SYN    | DESCRIPTION | DATE        | REPR                        |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| SUBMITTED FOR BID   | DATE   | SYN               | DESCRIPTION | DATE   | REPR        |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
|   |  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| <br>  | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">DES</td> <td style="width: 20%;">HMM</td> <td style="width: 20%;">DR</td> <td style="width: 20%;">SNL</td> </tr> <tr> <td>REVIEWED BY</td> <td>HMM</td> <td></td> <td></td> </tr> <tr> <td>FM/DM</td> <td>HMM</td> <td></td> <td></td> </tr> <tr> <td>CHIEF</td> <td>ENC/ARCH</td> <td>HMM</td> <td></td> </tr> </table> | DES               | HMM         | DR     | SNL         | REVIEWED BY | HMM                         |  |  | FM/DM               | HMM |  |           | CHIEF | ENC/ARCH | HMM                |           |  |                    |  |  |       |    |     |                     |
| DES   | HMM  | DR                | SNL         |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| REVIEWED BY   | HMM  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| FM/DM   | HMM  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| CHIEF   | ENC/ARCH   | HMM               |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">CODE ID. NO. 80091</td> <td style="width: 30%;">SIZE</td> <td style="width: 30%;">D</td> </tr> <tr> <td>SCALE:</td> <td colspan="2">NTS</td> </tr> <tr> <td>MAXIMO NO. N62470-08-D-1001</td> <td colspan="2"></td> </tr> <tr> <td>JOB ORDER NO. WE-25</td> <td colspan="2"></td> </tr> <tr> <td>SPEC. NO.</td> <td colspan="2"></td> </tr> <tr> <td>CONSTR. CONTR. NO.</td> <td colspan="2">112G02019</td> </tr> <tr> <td>NAVFAC DRAWING NO.</td> <td colspan="2"></td> </tr> <tr> <td>SHEET</td> <td>OF</td> <td>---</td> </tr> </table> | CODE ID. NO. 80091   | SIZE              | D           | SCALE: | NTS         |             | MAXIMO NO. N62470-08-D-1001 |  |  | JOB ORDER NO. WE-25 |     |  | SPEC. NO. |       |          | CONSTR. CONTR. NO. | 112G02019 |  | NAVFAC DRAWING NO. |  |  | SHEET | OF | --- | <p><b>PFD-1</b></p> |
| CODE ID. NO. 80091  | SIZE   | D                 |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| SCALE:  | NTS  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| MAXIMO NO. N62470-08-D-1001   |  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| JOB ORDER NO. WE-25   |  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| SPEC. NO.   |  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| CONSTR. CONTR. NO.  | 112G02019  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| NAVFAC DRAWING NO.  |  |                   |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |
| SHEET   | OF   | ---               |             |        |             |             |                             |  |  |                     |     |  |           |       |          |                    |           |  |                    |  |  |       |    |     |                     |

K:\11202223 - Aqua Buildings-Navy Project - H. Muel\11202019 - Temporary Construction Phase\02019\_PFD-1.dwg 12/19/2011 13:56





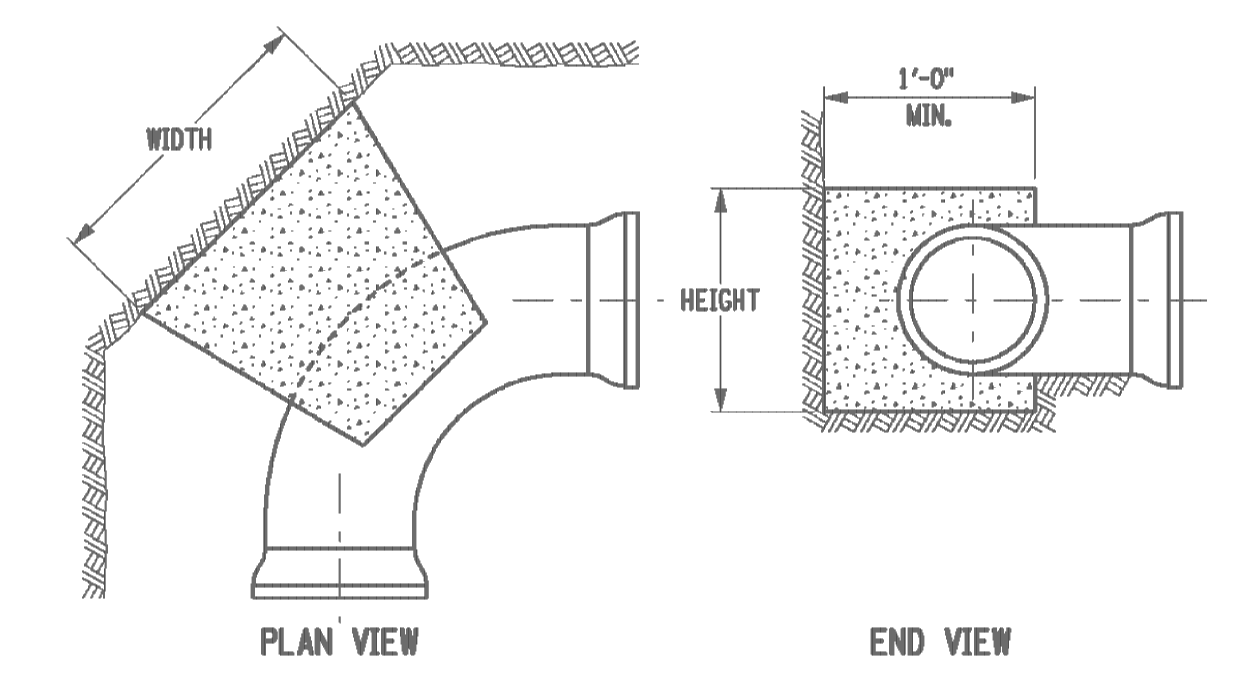
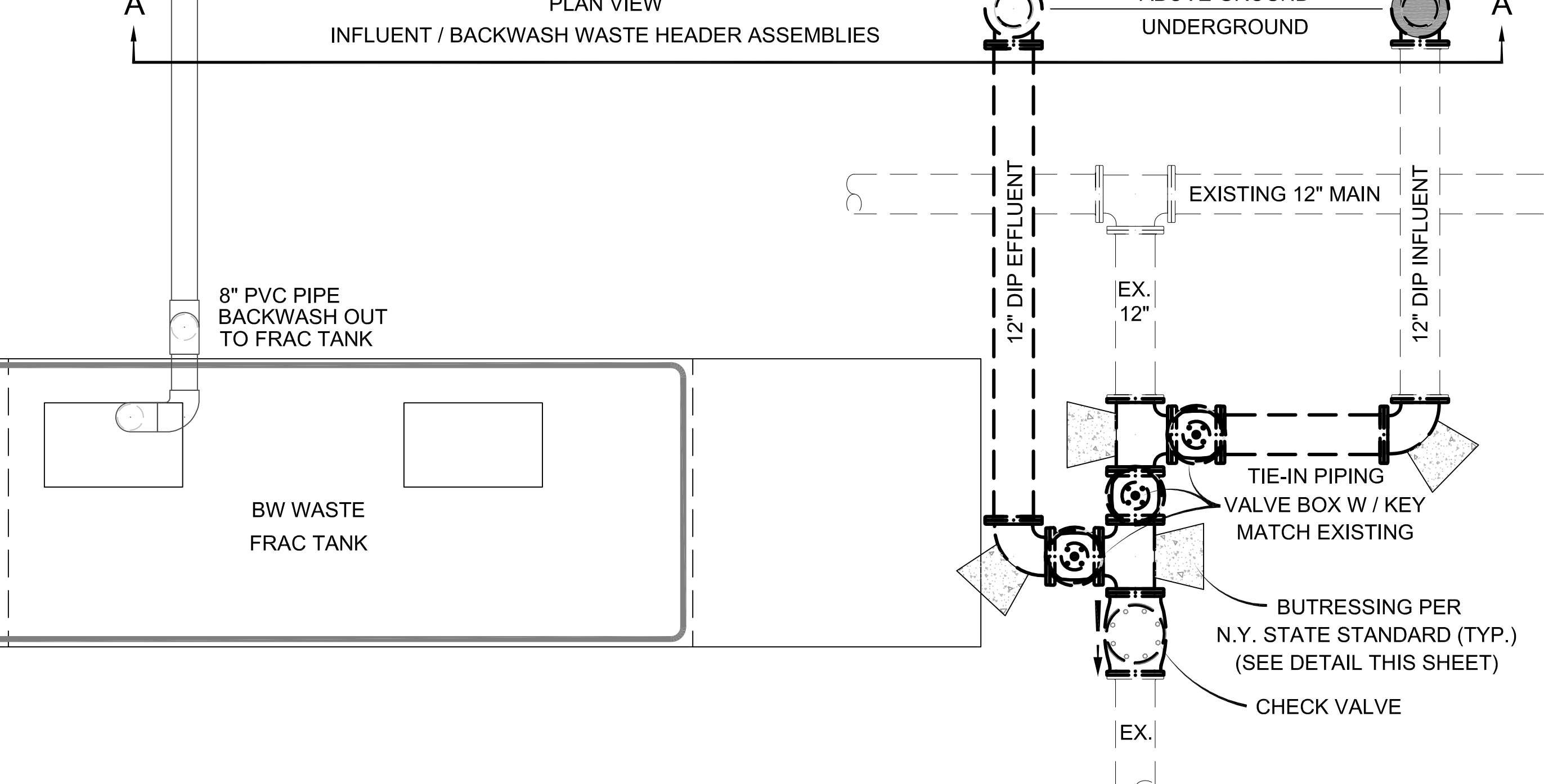
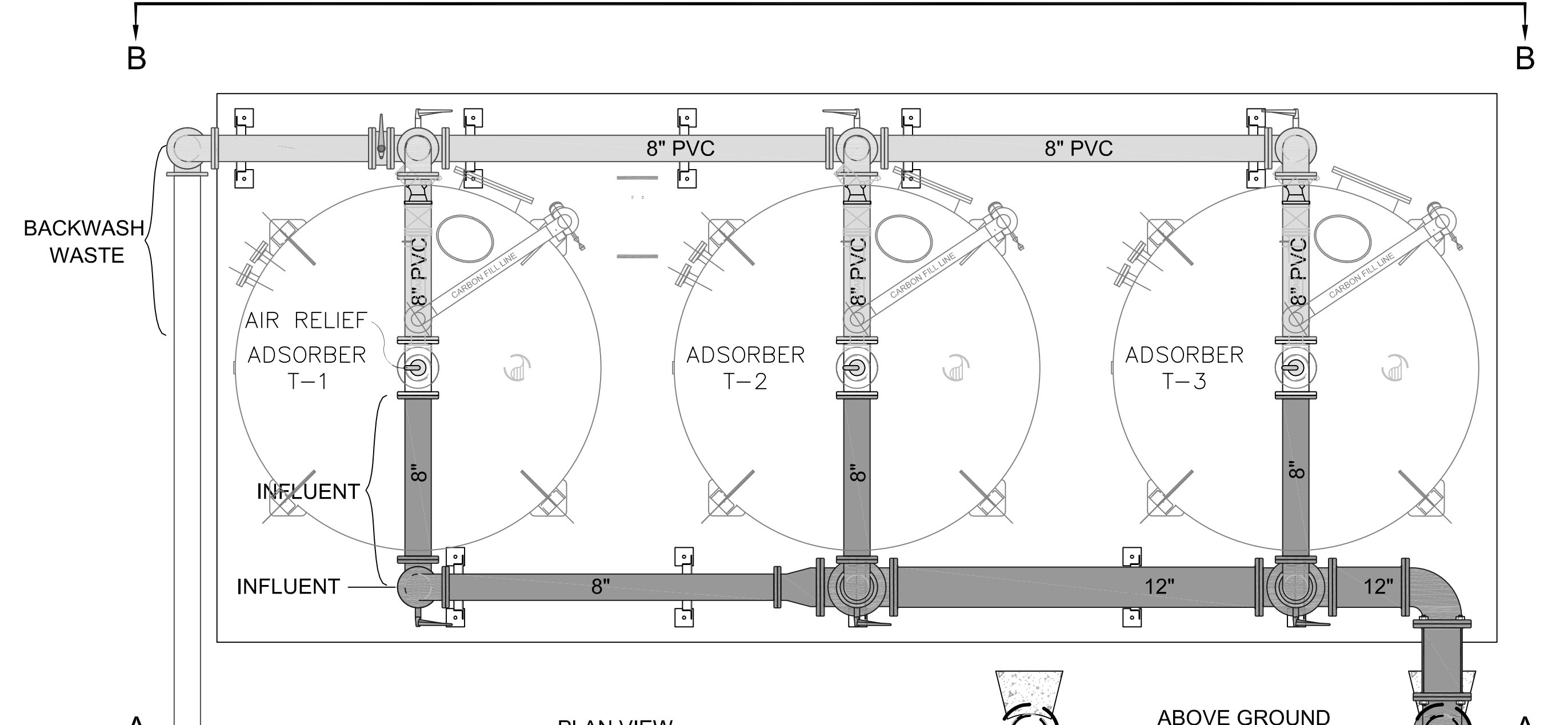
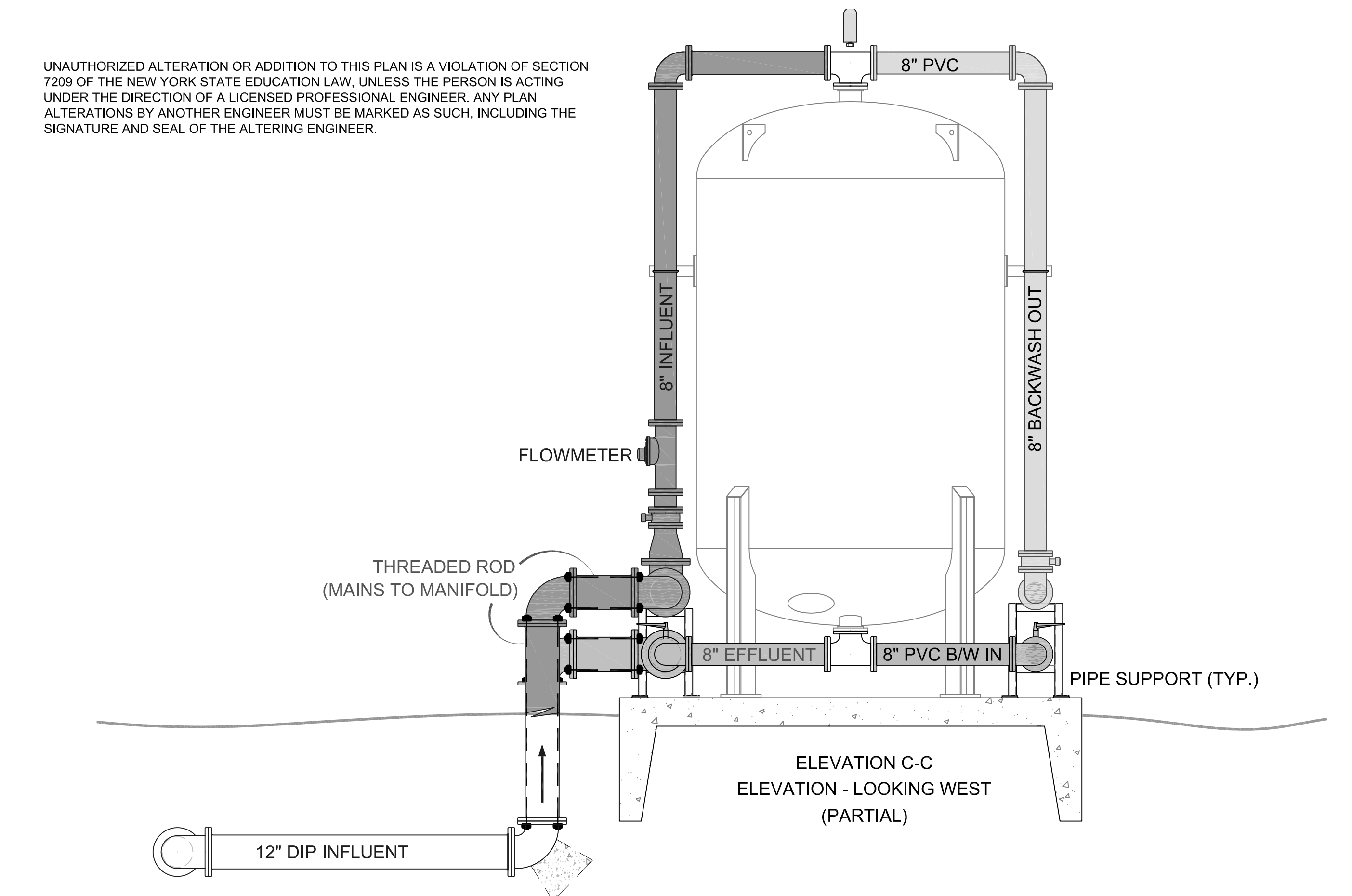
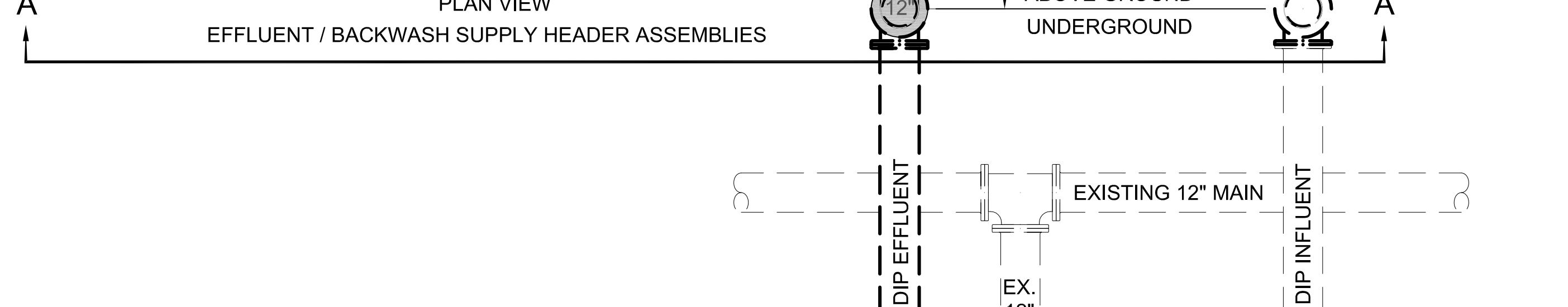
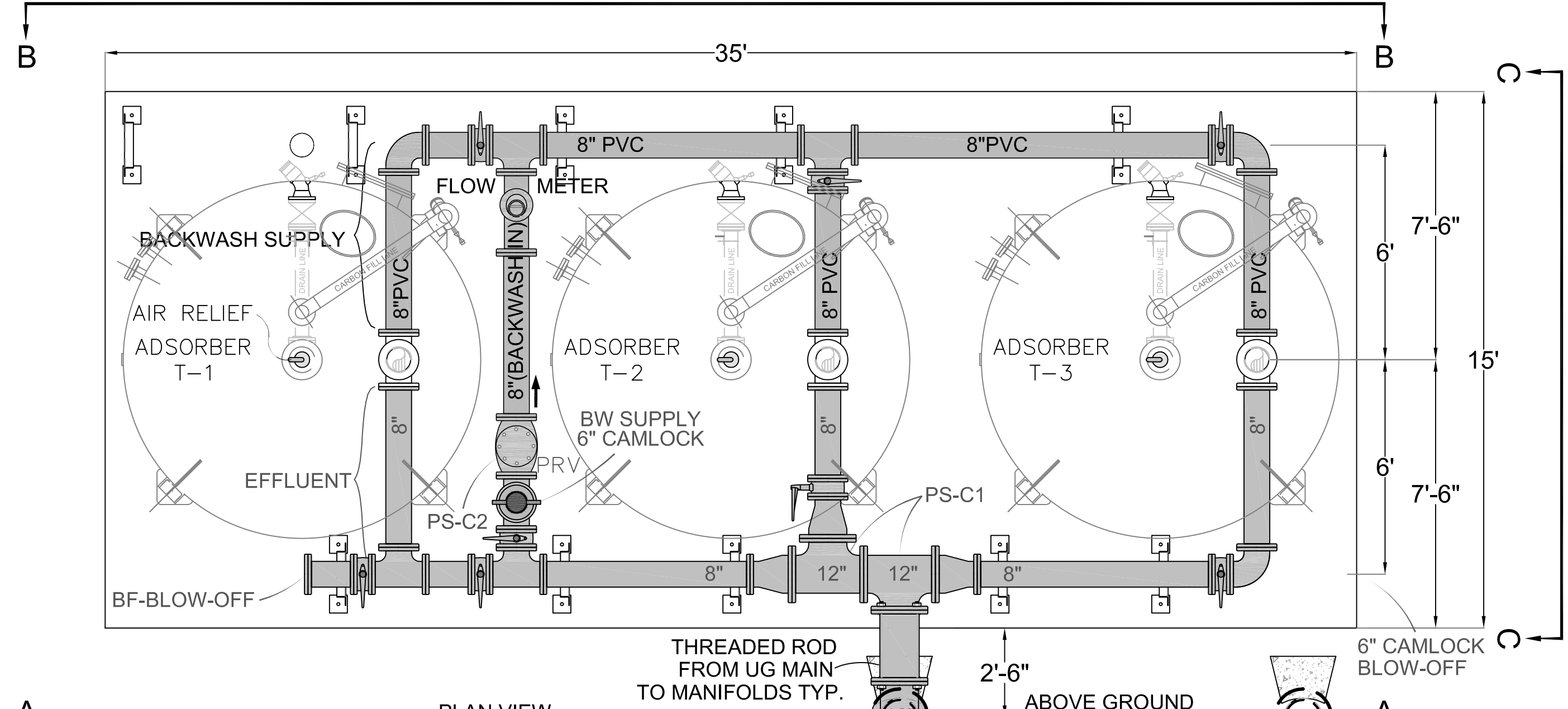


UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ANY PLAN ALTERATIONS BY ANOTHER ENGINEER MUST BE MARKED AS SUCH, INCLUDING THE SIGNATURE AND SEAL OF THE ALTERING ENGINEER.

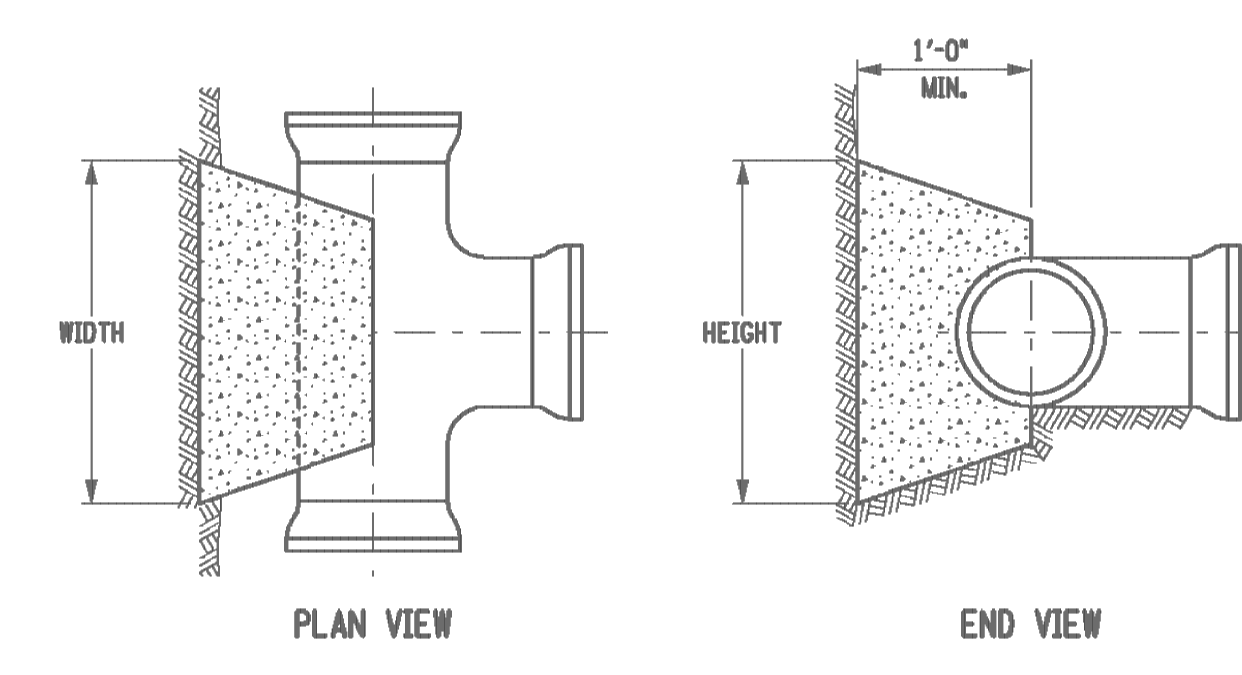
CAUTION: IF SHEET IS LESS THAN 34"x22" USE GRAPHIC SCALE

|   |                  |      |             |      |     |
|---|------------------|------|-------------|------|-----|
| 12/21/11  | HMM              | DR   | SNL         | DATE | RFR |
| SUBMITTED FOR BID   |                  |      | DESCRIPTION |      |     |
| NAVFAC  |                  |      | SYM         |      |     |
| Tt  |                  |      | P&ID        |      |     |
| DEPARTMENT OF THE NAVY<br>NAVAL FACILITIES ENGINEERING COMMAND ~ MID-ATLANTIC<br>NAVAL STATION - NORFOLK, VIRGINIA<br>AQUA NY<br>NASSAU COUNTY, NEW YORK<br>MODIFICATIONS TO WATER TREATMENT FACILITY - INTERIM EMERGENCY |                  |      |             |      |     |
| DES   | HMM              | DR   | SNL         |      |     |
| REVIEWED BY   | HMM              |      |             |      |     |
| FM/DM   | HMM              |      |             |      |     |
| CHIEF ENG/ARCH  | HMM              |      |             |      |     |
| CODE ID. NO.  | 80091            | SIZE | D           |      |     |
| SCALE:  | NTS              |      |             |      |     |
| MAXIMO NO.  | N62470-08-D-1001 |      |             |      |     |
| JOB ORDER NO.   | WE-25            |      |             |      |     |
| SPEC. NO.   |                  |      |             |      |     |
| CONSTR. CONTR. NO.  | 112G02019        |      |             |      |     |
| NAVFAC DRAWING NO.  |                  |      |             |      |     |
| SHEET   | OF ---           |      |             |      |     |
| <b>PID-2</b>  |                  |      |             |      |     |

K:\112G0223 - Aquar Bldg - Hwy Project - H. Mids\112G02019 - Temporary Construction Phase\02019\_P0-2.dwg 12/21/2011 10:07



| 90° BEND THRUST BLOCK DIMENSIONING |               |                |           |               |                |
|------------------------------------|---------------|----------------|-----------|---------------|----------------|
| PIPE SIZE                          | WIDTH (FT-IN) | HEIGHT (FT-IN) | PIPE SIZE | WIDTH (FT-IN) | HEIGHT (FT-IN) |
| 4 NPS                              | 2'-3"         | 1'-3"          | 14 NPS    | 7'-3"         | 3'-6"          |
| 6 NPS                              | 3'-3"         | 1'-9"          | 16 NPS    | 8'-3"         | 4'-0"          |
| 8 NPS                              | 4'-3"         | 2'-3"          | 18 NPS    | 9'-3"         | 4'-6"          |
| 10 NPS                             | 5'-3"         | 2'-6"          | 20 NPS    | 10'-6"        | 5'-0"          |
| 12 NPS                             | 6'-0"         | 3'-3"          | 24 NPS    | 12'-6"        | 6'-0"          |



| TEE/DEAD END THRUST BLOCK DIMENSIONING |               |                |           |               |                |
|--|---------------|----------------|-----------|---------------|----------------|
| PIPE SIZE                              | WIDTH (FT-IN) | HEIGHT (FT-IN) | PIPE SIZE | WIDTH (FT-IN) | HEIGHT (FT-IN) |
| 4 NPS                                  | 2'-0"         | 1'-0"          | 14 NPS    | 5'-6"         | 3'-3"          |
| 6 NPS                                  | 3'-0"         | 1'-3"          | 16 NPS    | 6'-6"         | 3'-6"          |
| 8 NPS                                  | 3'-3"         | 2'-0"          | 18 NPS    | 7'-6"         | 4'-0"          |
| 10 NPS                                 | 4'-3"         | 2'-3"          | 20 NPS    | 8'-6"         | 4'-3"          |
| 12 NPS                                 | 5'-3"         | 2'-6"          | 24 NPS    | 10'-3"        | 5'-3"          |

CAUTION: IF SHEET IS LESS THAN 34"x22" USE GRAPHIC SCALE

UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ANY PLAN ALTERATIONS BY ANOTHER ENGINEER MUST BE MARKED AS SUCH, INCLUDING THE SIGNATURE AND SEAL OF THE ALTERING ENGINEER.

12/21/11 HMM

DATE

SYN

DESCRIPTION

DES: HMM DR: SNL

REVIEWED BY: HMM

FM/DM: HMM

CHIEF ENG/ARCH: HMM

DEPARTMENT OF THE NAVY  
NAVAL FACILITIES ENGINEERING COMMAND - MID-ATLANTIC  
NAVAL STATION - NORFOLK, VIRGINIA  
AQUA NY

NASSAU COUNTY, NEW YORK  
MODIFICATIONS TO WATER TREATMENT FACILITY - INTERIM EMERGENCY

PIPING LAYOUT - PLAN VIEW

CODE ID. NO. 80091 SIZE D

SCALE: NTS

MAXIMO NO. N62470-08-D-1001

JOB ORDER NO. WE-25

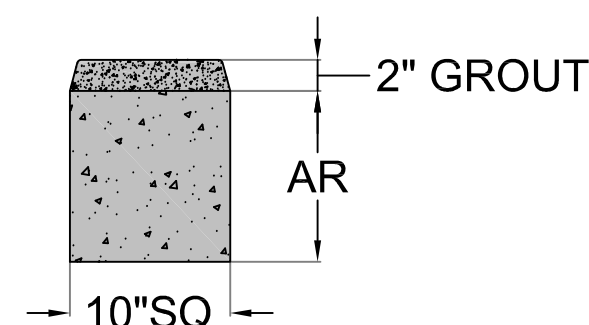
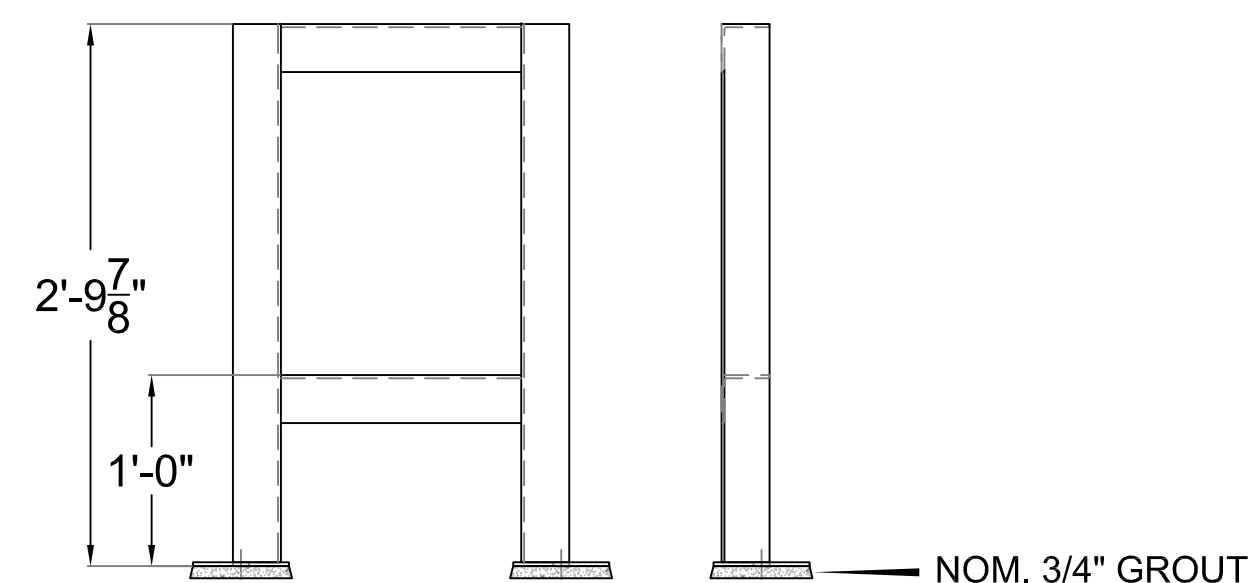
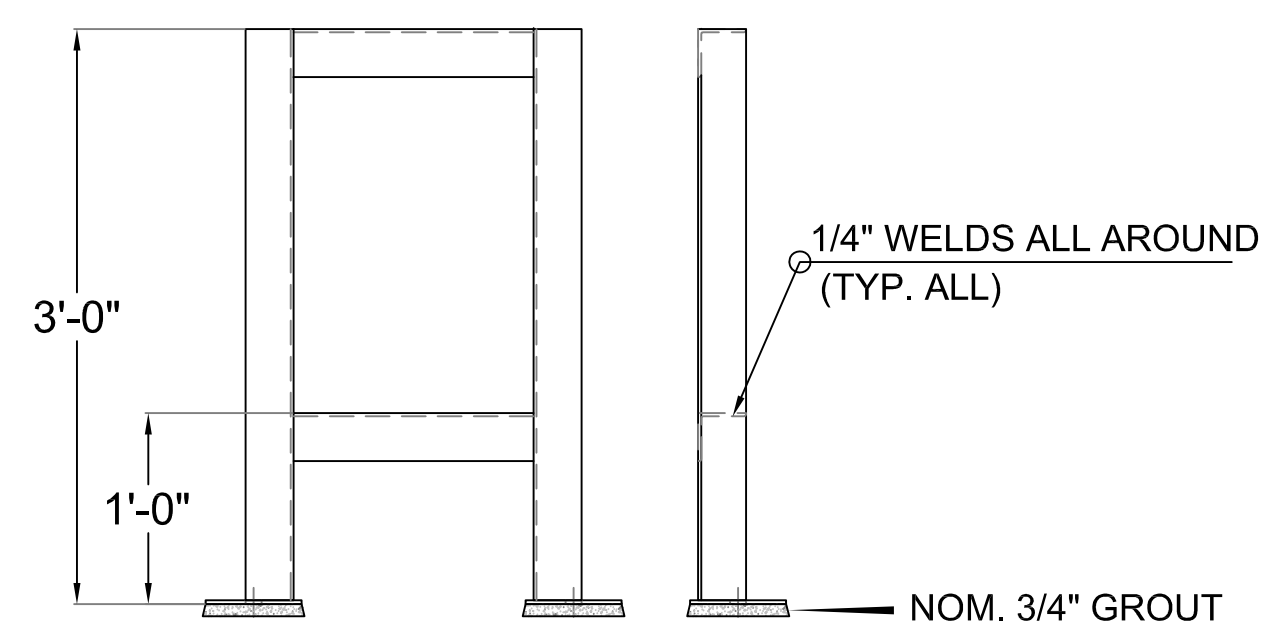
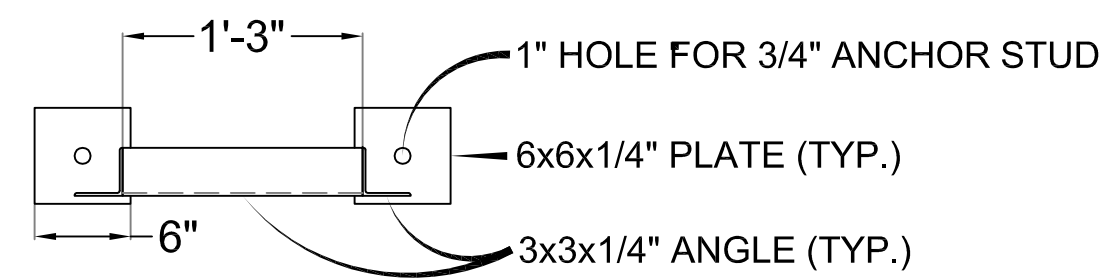
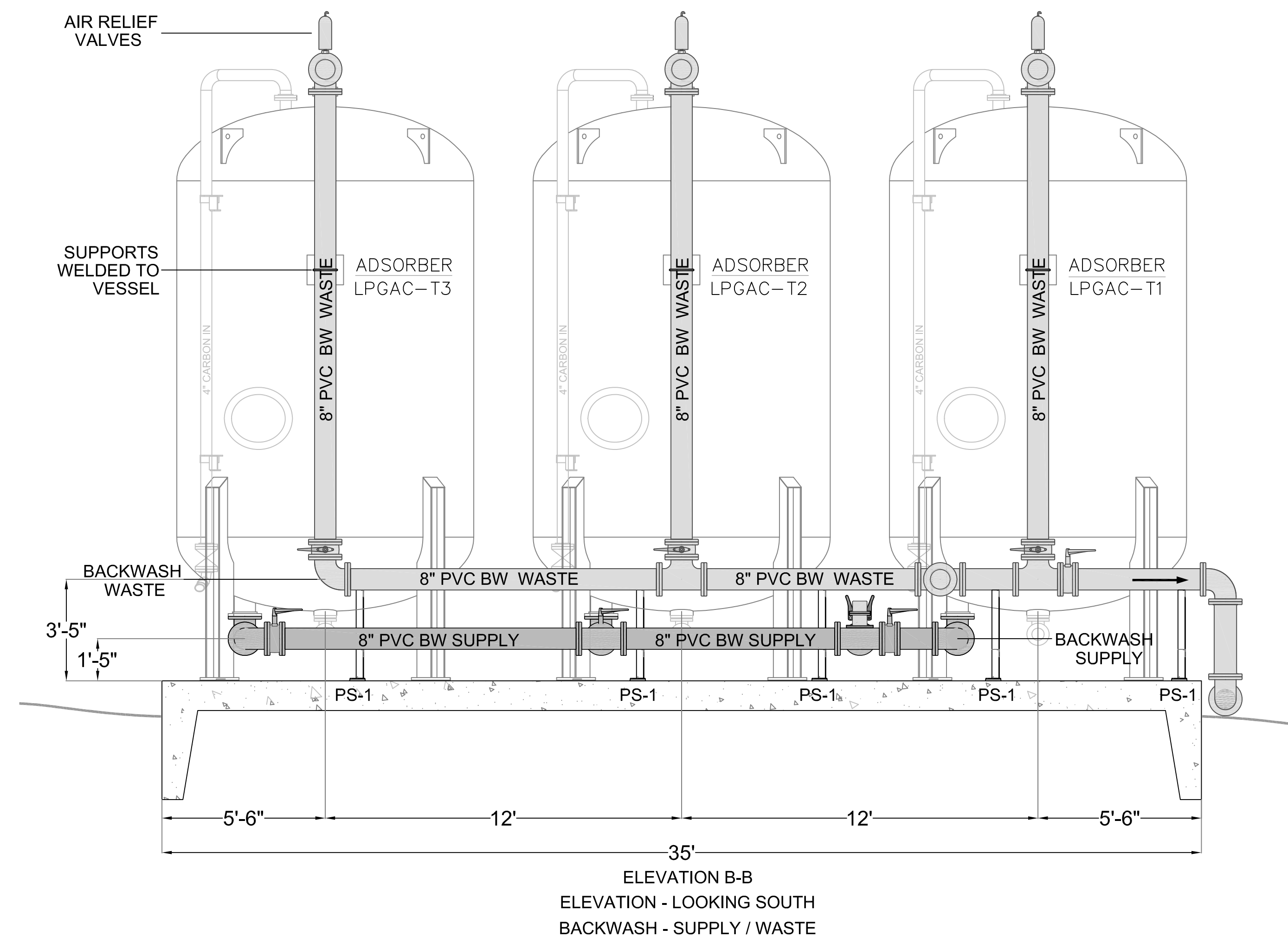
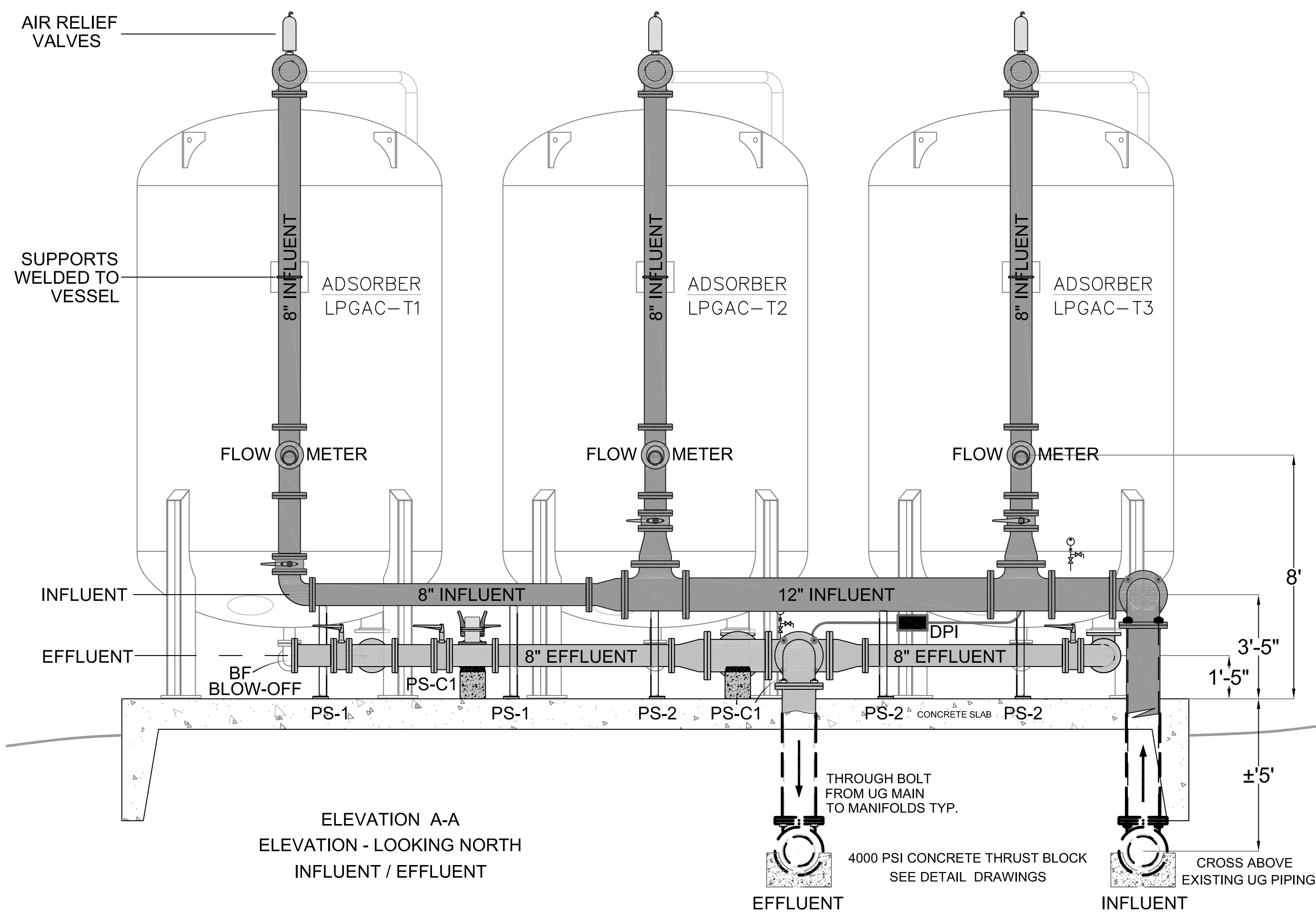
SPEC. NO. 112G02019

CONSTR. CONTR. NO. 112G02019

NAVFAC DRAWING NO.

SHEET OF ---

M-1

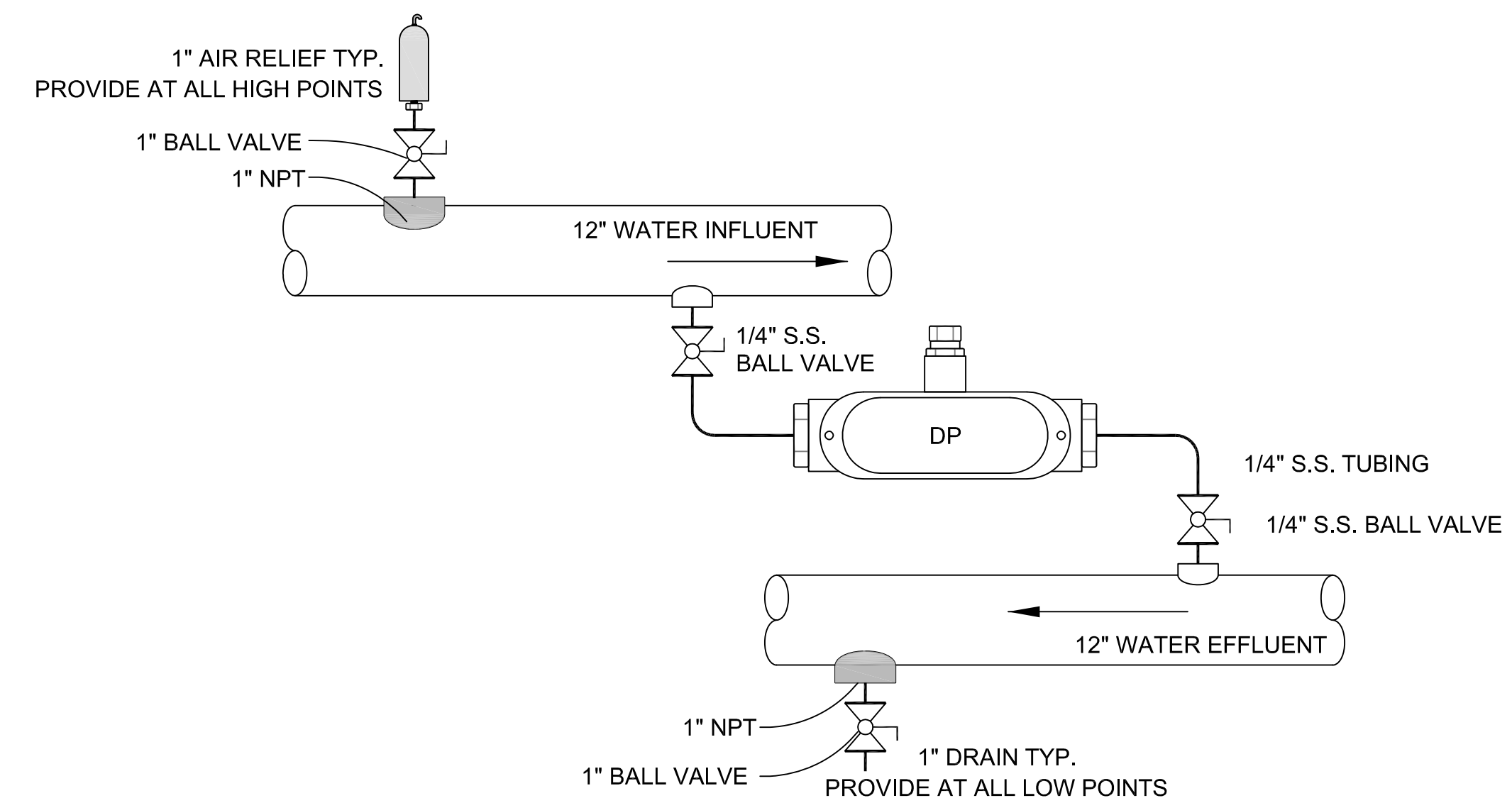


TYPE PS-1  
WITH (2) 8" PIPES

TYPE PS-2  
WITH (1) 8" & (1) 12" PIPE

TYPE PS-C1  
SUPPORT @ (2) 12" TEE'S (EFFLUENT)  
AND PRESSURE REDUCING VALVE  
4000 PSI CONCRETE

**PIPE SUPPORT - TYPICAL**  
DIMENSIONS SHOWN ARE APPROXIMATE  
FINAL MANIFOLD HEIGHTS WILL DEPEND ON NOZZLE HEIGHTS AFTER SETTING VESSELS  
VERIFY DIMENSIONS IN FIELD



**DIFFERENTIAL PRESSURE SENSOR DETAIL**

UNAUTHORIZED ALTERATION OR ADDITION TO THIS PLAN IS A VIOLATION OF SECTION 7209 OF THE NEW YORK STATE EDUCATION LAW, UNLESS THE PERSON IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER. ANY PLAN ALTERATIONS BY ANOTHER ENGINEER MUST BE MARKED AS SUCH, INCLUDING THE SIGNATURE AND SEAL OF THE ALTERING ENGINEER.

CAUTION: IF SHEET IS LESS THAN 34"x22" USE GRAPHIC SCALE

|   |   |      |            |
|---|---|------|------------|
| DATE  | 12/21/11  | HMM  |            |
| DESCRIPTION   | NAVFAC  | SYN  |            |
| SYMBOL  | NAVFAC  |      |            |
| DATE  |   | HMM  |            |
| DESCRIPTION   |   | HMM  |            |
| DES   | HMM   | DR   | SNL        |
| REVIEWED BY   | HMM   |      |            |
| FM/DM   | HMM   |      |            |
| CHIEF ENG/ARCH                                      | HMM   |      |            |
| DEPARTMENT OF THE NAVY                              | NAVFACILITIES ENGINEERING COMMAND - MID-ATLANTIC              |      |            |
| NAVAL FACILITIES ENGINEERING COMMAND - MID-ATLANTIC | NAVAL STATION - NORFOLK, VIRGINIA                             |      |            |
| NORFOLK, VIRGINIA                                   | NASSAU COUNTY, NEW YORK                                       |      |            |
| AQUA NY   | MODIFICATIONS TO WATER TREATMENT FACILITY - INTERIM EMERGENCY |      |            |
|   | PIPING LAYOUT - ELEVATIONS                                    |      |            |
| CODE ID. NO.  | 80091   | SIZE | D          |
| SCALE:  | NTS   |      |            |
| MAXIMO NO.  | N62470-08-D-1001  |      |            |
| JOB ORDER NO.                                       | WE-25   |      |            |
| SPEC. NO.   |   |      |            |
| CONSTR. CONTR. NO.                                  | 112G02019   |      |            |
| NAVFAC DRAWING NO.                                  |   |      |            |
| SHEET   | OF  |      |            |
|   |   |      | <b>M-2</b> |

