

**BIG V SUPERMARKETS, INC.  
BALDWIN PLACE MALL  
SOMERS, NEW YORK**

**TECHNICAL SPECIFICATIONS  
FOR  
PUMP AND TREAT GROUNDWATER REMEDIATION SYSTEM**

**MAY 1997**



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Project No. 722-001

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3 July 1997  
File No. 722-001

Mr. Ramanand Pergadia, P.E.  
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New York State Department of Environmental Conservation  
21 South Putt Corners Road  
New Paltz, NY 12561-1696

Re: Baldwin Place Mall  
Site ID #360023

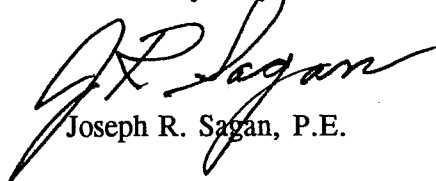
Dear Mr. Pergadia:

We are hereby submitting for your review three (3) copies of the following documents for the Groundwater Remediation System at Baldwin Place Mall:

- Final Plans (Sheets 1-5)
- Technical Specifications
- Engineering Report

If you have any questions regarding this submittal, please call me or Stu Bassell at our Pearl River office.

Yours very truly,



Joseph R. Sagan, P.E.

JRS/mb

enc.

cc: T. Dorado, Big V  
P. Gitlen, WOH  
L. Davis

# TECHNICAL SPECIFICATIONS

## TABLE OF CONTENTS

00300 Bid Item Description and Bid Form

### **DIVISION 1 - GENERAL REQUIREMENTS**

01010 Summary of Work

01100 Special Project Procedures

01060 Regulatory Requirements

01340 Submittals

01730 Health, Safety and Emergency Response

### **DIVISION 2 - SITEWORK**

02050 Mobilization and Site Maintenance

02145 Fence

02200 Earthwork

02605 Recovery Well Construction

### **DIVISION 3 - CONCRETE**

03300 Concrete

### **DIVISION 7 - THERMAL AND MOISTURE PROTECTION**

07200 Moisture Barrier

### **DIVISION 13 - SPECIAL CONSTRUCTION**

13120 Superstructure for Treatment Building

### **DIVISION 15 - MECHANICAL**

15100 Mechanical

### **DIVISION 16 - ELECTRICAL**

16010 Electrical Work

16110 Conduit Systems

16120 Wires and Cables

16450 Grounding System

16470 Panelboards

16500 System Control Panel

LMS 722-001

**TECHNICAL SPECIFICATIONS**

**TABLE OF CONTENTS**

*Continued*

**APPENDICES**

**A - COMMUNITY AIR MONITORING PLAN**

**B - GEOLOGIC LOGS OF TEST BORINGS**

**LMS 722-001**

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## SUMMARY OF WORK

### SECTION 01010

#### INDEX

- 1.0 LOCATION AND HISTORY
- 2.0 WORK SUMMARY
- 3.0 DESIGN PHASE DATA
- 4.0 COMMUNITY AIR MONITORING

#### 1.0 LOCATION AND HISTORY

Baldwin Place Mall (the Site) is a 28 acre, mostly vacant shopping center, located in the Town of Somers, Westchester County, New York. The site is accessed from U.S. Route 6.

A localized area of the Site has soil contaminated primarily with perchloroethylene (PCE) and, to a lesser extent, trichloroethylene (TCE) and environmental degradation products of PCE and TCE. The downgradient areas have groundwater contaminated with these constituents.

New York State Department of Environmental Conservation (NYSDEC) has concluded that the contamination is a result of activities by a former dry cleaner that had leased space at the Site.

The Agency has listed the Site as an Inactive Hazardous Waste Site (ID No. 36-0023). A Remedial Investigation/Feasibility Study (RI/FS) was subsequently completed to address the soil and groundwater contamination. On 9 November 1995, NYSDEC issued its Record of Decision (ROD). The Owner has entered into a NYSDEC consent order to implement the work in the ROD.

The ROD requires the construction of a groundwater remediation system, excavation of contaminated soil, and other elements. The work described in these specifications is for the groundwater remediation element of the ROD.

In February 1997, approximately 236 tons of contaminated soil were excavated and later disposed off-site. The area of excavation is shown on the plans. The soil removal was completed by first excavating soil to the depth of the grade beam of the former building foundation. Sheet piling was then driven adjacent to the grade beams and around the remainder of the excavation to stabilize its sides. Contaminated soil was then excavated to a depth of 15 ft below ground surface (BGS) in the western half of the excavation and 10 ft in the eastern half. After the excavation, the pit was backfilled with 3/4-in. crushed stone to within 2 ft of the ground surface. Filter fabric was placed over the stone and backfill was completed with common fill.

There is soil remaining outside the area of excavation that contains low concentrations of contaminants. Based on available data, the highest concentration outside the excavation area is 0.012 mg/kg of PCE. However, there may be soil with higher concentrations of contaminants in the immediate vicinity of the excavation backfill.

Beneath the crushed stone backfill of the excavation, the soil contains PCE at concentrations as high as 6.5 mg/kg.

As a result of concern about residual contamination, there will be special handling practices for soil and water removed within 10 ft of the excavation during the work covered by these specifications.

## **2.0 WORK SUMMARY**

This section covers the general requirements for the construction of two groundwater pumping wells, treatment facility, forcemains, etc., and management of contaminated and uncontaminated soil and water encountered during this construction or other site activities covered under these specifications. The Contractor shall furnish all equipment, labor, material, disposal fees, other fees, permits, taxes and incidentals to complete the work.

The work includes the construction of two groundwater pumping wells. Drill cuttings shall be spread in an area designated by the Engineer on the concrete slab of the former building to a depth of less than 3 in. to allow volatilization of contaminants. Fluids generated during the drilling and development of the wells shall be placed in container(s) and disposed off-site.

The work includes trenching and construction of forcemains (one for each pumping well) and electrical and instrumentation supply from the wells to the treatment building. Soils excavated within 10 ft of the February 1997 excavation shall be spread in an area designated by the Engineer on the concrete slab to a depth of less than 3 in., unless the Engineer determines that the soils can be managed otherwise. Water removed from the trench within 10 ft of the February 1997 excavation shall be placed in container(s) and disposed off-site.

The work includes the installation of a groundwater treatment building at the eastern end of the work area. The building will be a prefabricated metal building erected on-site or pre-erected at the manufacturer's plant, within the requirements of the plans and specifications. Treatment will consist of filter cartridges to remove particulates and activated carbon to remove volatile contaminants.

## **3.0 DESIGN PHASE DATA**

Additional pertinent information, such as drill logs and chemical data, is presented in the RI report and plans and specifications for the February 1997 excavation, which shall be obtained and reviewed by the Contractor.

## **4.0 COMMUNITY AIR MONITORING**

The Engineer will complete the air quality testing and notifications required by the Community Air Monitoring Plan (CAMP), a copy of which is presented in Appendix A of these specifications. This testing is independent of, and in addition to, any air testing completed by the Contractor to meet the requirements of Section 01730 of these specifications.

The CAMP will be implemented when there is intrusive work within 10 ft of the February 1997 excavation area, spreading of (contaminated) soils on the concrete slab, and transfer of contaminated water generated within 10 ft of the February 1997 excavation area. Based on measurements made during the February 1997 excavation, there is no need to complete the CAMP monitoring of air borne particulates.

The work has been designed and scheduled to avoid the need to implement the Vapor Emission Response Plan portions of the Community Air Monitoring Plan. In the event that there is an unexpected need to temporarily cease work activity as a result of high emissions, the Engineer shall order the Contractor to temporarily stop work and take additional steps to suppress vapor emissions.

[END OF SECTION]

## REGULATORY REQUIREMENTS

### SECTION 01060

#### INDEX

#### 1.0 GENERAL

#### 1.0 GENERAL

The Owner will obtain all permits required for the work on-site, except that the Contractor shall be responsible for his own licenses as applicable, and for permitting/licensing for storage/transportation/disposal of contaminated water per Section 01100 of these specifications.

The Contractor shall coordinate and cooperate with local or state permitting agencies and electric utility company to arrange for inspections, transfer of information, etc.

[END OF SECTION]



## SPECIAL PROJECT PROCEDURES

### SECTION 01100

#### INDEX

- 1.0 CONTAMINATED WATER
- 2.0 UNCONTAMINATED WATER
- 3.0 TRENCH TO RW-1S
- 4.0 MANAGEMENT OF POTENTIALLY CONTAMINATED SOIL

#### 1.0 CONTAMINATED WATER

- 1.1 Contaminated water is water removed during well construction, well development, trench dewatering within 10 ft of the February 1997 excavation, and other water removed from the ground or structures within 10 ft of the February 1992 excavation, unless the Engineer determines that the water is not contaminated. Water that contains PCE at a concentration of 5  $\mu\text{g/l}$  or less is not contaminated.
- 1.2 The Contractor shall store in container(s) on-site, transport off-site, and arrange and pay for off-site treatment of contaminated water generated during the work. On-site storage may be in drums with water-tight lids or in a bulk vessel, e.g., frac tank.
- 1.3 Based on the history of the site, the contaminated water shall be managed as a RCRA hazardous waste pursuant to New York State and federal hazardous waste regulations and manifested as EPA Hazardous Waste No. F002. It is possible that the contaminated water may also meet the definition of a D039 waste. The EPA ID Number for the Site is NY0000098558.
- 1.4 The Contractor shall haul contaminated water with vehicles with a valid New York waste transporter permit (and permits for any other states as applicable). The Contractor shall verify and document that the transporter has a current waste transporter's permit authorizing the transport of the project wastestreams to the intended final disposal facility(ies) subject to the approval of the Engineer. The Contractor shall coordinate all shipments and arrivals at the disposal facilities to meet project schedule requirements. The Contractor shall complete any required shipping papers/manifests, placarding, and weighing/load measurements and provide documentation/copies to the Engineer. At least seven calendar days prior to the scheduled shipment of any hazardous waste, the Contractor shall submit partially completed manifest forms to the Owner for signing, and copies to the Engineer for review.
- 1.5 The Contractor shall ensure that trucks used are protected against contamination to the environment, and to other materials transported, by properly covering and lining them with compatible material and/or by decontaminating them prior to any use other than hauling contaminated materials. The Contractor shall verify that any trucks/tankers used to transport liquid or materials with free-flowing liquid are not leaking.

- 1.6 The Contractor shall be held responsible for any and all actions necessary to remedy situations involving material spilled in transit or mud and dust tracked off-site. This cleanup shall be accomplished at the Contractor's expense.
- 1.7 The Contractor will use only approved transporters as outlined in his submittals specified in Section 01300 unless there is prior written approval of the Engineer.
- 1.8 The Contractor shall not combine contaminated materials from other projects with materials from the Site.
- 1.9 The Contractor will determine weights and measurements of the wastes, such as liquid volume, prior to material leaving the site. The Contractor shall also receive weight tickets or other measurements from the disposal facilities and provide such documentation to the Engineer. Any deviation between records of materials shipped and materials received will be reported immediately to the Engineer.
- 1.10 The results of any acceptance testing required by the disposal facility prior to shipment shall be submitted to the Engineer at least five days prior to off-site shipment of the contaminated water. The results of any testing conducted by the disposal facilities after shipment shall be submitted to the Engineer within 21 calendar days after shipment.

## **2.0 UNCONTAMINATED WATER**

- 2.1 Uncontaminated water generated during dewatering shall be discharged to a swale in the work area after filtering through hay bales or other method approved by the Engineer.
- 2.2 Low volume wastewater generated by rinsing of equipment or steam cleaning may be discharged directly to the ground in the work area.

## **3.0 TRENCH TO RW-1S**

- 3.1 Prior to construction of the wells, the Contractor shall construct a 10 ft deep trench, backfilled with 3/4-in. crushed stone to within 2 ft of the ground surface, between the February 1997 excavation and the RW-1S drill site. RW-1S is then to be constructed through the terminus of the trench. The purpose of the trench is to hydraulic connect the stone backfill of the February 1997 excavation to RW-1S.

## **4.0 MANAGEMENT OF POTENTIALLY CONTAMINATED SOIL**

- 4.1 Unless otherwise directed by the Engineer, drill cuttings and soils excavated within 10 ft of the February 1997 excavation shall be spread on the adjacent concrete slab at a depth not to exceed 3 in. The Engineer may direct these soils to be spread on the pavement or stockpiled in the work area. The Engineer will analyze the organic vapors (if any) emanating from these potentially contaminated soils with a hand-held organic vapor analyzer.

- 4.2 On two occasions, the Contractor shall scrape up the (contaminated) soil spread on the concrete slab into a pile and then respread the soil to a depth not to exceed 3 in. Not less than one day after the final spreading, the Contractor shall place and grade these soils in the vicinity of the new treatment building, as directed by the Engineer. Other excess soils, but not debris, (which shall be disposed off-site at the Contractor's expense), shall also be placed and graded near the treatment building.

[END OF SECTION]

## **SUBMITTALS**

### **SECTION 01340**

#### **INDEX**

- 1.0 GENERAL**
- 2.0 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES**
- 3.0 CONTRACTOR'S RESPONSIBILITIES**
- 4.0 GENERAL PROCEDURES FOR SUBMITTALS**
- 5.0 SUBMITTAL PROCESS**

#### **1.0 GENERAL**

##### **1.1 Scope of Work**

The Contractor shall provide the submittals identified in each specification section for approval by the Engineer.

##### **1.2 Not used.**

#### **2.0 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES**

##### **2.1 Shop Drawings**

All drawings, diagrams, illustrations, schedules and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

**2.2** Shop Drawings, as defined in the Contract Clauses, and as specified in individual work sections include, but are not necessarily limited to, fabrication and erection/installation drawings, scheduled information, setting diagrams, actual shopwork manufacturing instruction, and coordination drawings, as applicable to the work.

**2.3** All details on shop drawings submitted for approval shall show clearly the elevations of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for approval.

##### **2.4 Product Data**

Product data include standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's printed statements of compliances and applicability, catalog cuts, product photographs, production or quality control inspection and test reports and certifications, and product warranties.

## 2.5 Samples

Samples specified in individual sections include physical samples of the items to be used in the work.

- 2.6 Product data and samples shall also include, if requested by the Engineer, items of disposable clothing, safety equipment, breathing apparatus, communication devices, items of equipment to be used on the site, and any other items which are required for the safety and health of all personnel on the site.

## 2.7 Contaminated Water

The Contractor shall describe his proposed method for storing contaminated water and provide the names, addresses, and telephone numbers of the proposed hauler and disposal facility(ies).

## 3.0 CONTRACTOR'S RESPONSIBILITIES

- 3.1 The Contractor shall review shop drawings, product data, and samples prior to submission to determine and verify the following:

- A. Field measurements.
- B. Field construction criteria.
- C. Catalog numbers and similar data.
- D. Conformance with the Specifications, Protocol, and Contingency Plans.

- 3.2 Notify the Engineer in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents.

- 3.3 The review and approval of shop drawings, samples or catalog data by the Engineer will not relieve the Contractor from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefore.

- 3.4 No portion of the work requiring a shop drawing, working drawings, sample, or catalog data shall be started nor shall any materials be fabricated, installed or used on this site prior to the approval or qualified approval of such items. Fabrications performed, materials purchased or onsite construction accomplished which does not conform to approved shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

- 3.5 Project work, materials, fabrication, and installation shall conform with approved shop drawings, working drawings, applicable samples, and catalog data.

#### 4.0 GENERAL PROCEDURES FOR SUBMITTALS

4.1 The submittals shall be promptly made in accordance with the procedures described below. The submission requirements, review process, and final distribution of the submittals shall be as specified in the Contract Clauses and as specified hereinafter.

4.2 Four (4) copies of all drawings, schedules and brochures shall be submitted for approval. Black line prints, blue line prints or reproducible transparencies are required. Blueprints (white lines on a blue background) are not acceptable. Each submittals shall have the job name on it and the appropriate specification section or contract drawing reference.

4.3 Submittals will be returned, stamped with the following classifications:

- A. "Approved" - There are no notations or comments on the submittal and, in the Engineer's opinion, the submittal meets the requirements of the Contract Documents and the Contractor may release the equipment for production.
- B. "Approved as Noted" - Notations have been made on the submittals to insure conformance with the Contract Documents. The Contractor may release the equipment for production in accordance with the notation.
- C. "Not Approved" - The submittal does not meet the requirements of the Contract Documents. The Contractor must submit the specified product.
- D. "Revise and Resubmit" - When the material submitted is incorrect or insufficient to review properly and it is necessary to see the complete package.
- E. "Resubmit Record Copy" - Used with the review action "Approved As Noted." The resubmittal shall incorporate notations.

#### 4.5 Submittal Register

- A. Within 10 days after receipt of a Notice to Proceed, the Contractor shall complete and submit to the Engineer for approval, a submittal register. No site work shall commence until the submittal register is approved.
- B. The order of listing of items forming a system or that are interrelated shall be scheduled to be correlated and submitted concurrently. Certifications to be submitted with the pertinent drawings shall be so scheduled. Adequate time (a minimum of 20 calendar days) will be allowed on the register for review and approval and possible submittal of any items subject to approval, including coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities, because no delay damages or time extensions will be allowed for time lost in late submittals or resubmittals for such items.
- D. The Engineer will review the Submittal Register for approval action. The approved Submittal Register will be promptly returned to the Contractor.

- E. The approved Register shall become a part of the contract and the Contractor shall be subject to the requirements thereof. The Contractor shall revise and/or update the register monthly to take into account all changes in the contract. Each such revised addition and/or revision of the Register shall be submitted to the Engineer for approval. This Register and the progress schedules shall be coordinated.

5.0 SUBMITTAL PROCESS

George Sorensen

- 5.1 The Contractor shall submit all items listed on the contract drawings and listed or specified in the other sections of these specification to Lawler, Matusky & Skelly Engineers, One Blue Hill Plaza, P.O. Box 1509, Pearl River, New York 10965, Attention ~~J.R. Sagan, P.E.~~. The Engineer may request submittals, in addition to those listed, when deemed necessary to adequately describe the work covered in the respective sections. Each submittal shall be completed and in sufficient detail for ready determination of compliance with the contract requirements. Prior to submittal, all items shall be checked and approved by the Contractor and each respective submittal form shall be stamped, initialed, and dated by the Contractor certifying that the accompanying submittal complies with the contact requirements.
- 5.2 The Contractor shall carefully control his procurement operations to assure that each individual submittal is made on or before the corresponding date scheduled on his approved "SUBMITTAL REGISTER."
- 5.3 Payment for materials incorporated into the work will not be made if required approvals have not been obtained.
- 5.4 At the time of each submission, Contractor shall give Engineer specific written notice of such variations, if any, that the shop drawing or sample submitted may have from the requirements of the contract documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each shop drawing and sample submitted to Engineer for review and approval of each such variation.
- 5.5 Engineer will review and approve shop drawings and samples in accordance with the submittal register accepted by the Engineer. Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the work, conform to the information given in the contract documents and be compatible with the design concept of the completed project as a functioning whole as indicated by the contract documents. Engineer's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where a specific means, method, technique, sequence of procedure of construction is specifically and expressly called for by the contract documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make corrections required by Engineer, and shall return the required number of corrected copies of shop drawings and submit as required samples for review and

approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Engineer on previous submittals.

5.6 Engineer's review and approval of shop drawings or samples shall not relieve Contractor from responsibility for any variation from the requirements of the contract documents unless Contractor has in writing called Engineer's attention to each variation at the time of submission as required and Engineer has given written approval of each such variation by a specific written notation thereof incorporated in or accompanying the shop drawing or sample approval; nor will any approval by Engineer relieve Contractor from responsibility for complying with the requirements of paragraph 3.0.

5.7 Where a shop drawing or sample is required by the contract documents or submittal register accepted by Engineer any related work performed prior to Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

**5.8 Additional Requirements for Submittals**

A. Shop drawings are not part of the contract documents, but are a supplementary means of communications to assist in the understanding of what the Contractor proposes to provide and to establish that whatever he intends to install either does or does not conform to the Plans and Specifications.

B. Contractor shall submit a letter with the shop drawings for each piece of equipment signed and certified by an authorized representative of the Equipment Manufacturer which certifies that the subject equipment meets or exceeds the current OSHA/ANSI and local industrial codes for safety. The letter shall also specifically identify any exceptions that the Equipment Manufacturer has taken in not providing the required safety devices as they relate to the above codes.

C. Contractor shall be responsible for the prompt submission of all shop and working drawings in accordance with the submittal register so that there shall be no delay to the work due to the absence of such drawings.

D. Each Contractor shall submit for review and approval four (4) copies of all specified operating and maintenance manuals.

E. When reviewed, one sample of each item will be returned to the Contractor and shall be kept and maintained in good condition at the project site for later use in comparison with material actually delivered for the work.

[END OF SECTION]



# HEALTH, SAFETY, AND EMERGENCY RESPONSE

## SECTION 01730

### INDEX

- 1.0 GENERAL
- 2.0 SUBMITTALS

### 1.0 GENERAL

1.1 The work covered by this Contract is considered a cleanup operation at an uncontrolled hazardous site being cleaned up under government mandate. Per federal requirements expressed in 29 CFR 1910, the Contractor must staff this project with employees having been provided certain required training, prepare a health and safety plan (HASP), and meet other requirements of these regulations.

1.2 As detailed in 4.0 of Section 01010, the Engineer will only be conducting the air monitoring required by the Community Air Monitoring Program and air monitoring over potentially contaminated soils that are to be spread on the concrete slab.

### 2.0 SUBMITTALS

2.1 The Contractor shall submit to the Engineer four copies of his HASP for review. The Engineer will transmit copies of the HASP to NYSDEC. The Engineer will neither approve nor disapprove the HASP.

2.2 The HASP shall meet the requirements of 29 CFR 1910.

[END OF SECTION]

# MOBILIZATION AND SITE MAINTENANCE

## SECTION 02050

### INDEX

- 1.0 GENERAL
- 2.0 SITE SECURITY
- 3.0 FIELD OFFICES
- 4.0 UTILITIES
- 5.0 LAYDOWN AREAS
- 6.0 PROTECTION OF PUBLIC AND PRIVATE PROPERTY
- 7.0 TREE AND PLANT PROTECTION
- 8.0 PARKING
- 9.0 NOISE CONTROL
- 10.0 DUST CONTROL
- 11.0 TEMPORARY DRAINAGE PROVISIONS
- 12.0 POLLUTION CONTROL
- 13.0 CLEANUP

### 1.0 GENERAL

The Contractor shall be responsible for site preparation and restoration, site security, providing and maintaining an adequate supply of electric, telephone and sanitary services for the project, construction and maintaining material laydown areas, parking, barricades and lighting, protection of public and private property, noise, dust and pollution control, temporary drainage, tree and plant protection, removal of all temporary materials, and cleaning, repairing and restoring the site following removal of temporary installations and facilities, as specified herein and as indicated on the Contract Drawings.

### 2.0 SITE SECURITY

Although the Owner has fenced the site, the Contractor shall maintain control of the site and shall be responsible for protection and security of the site, and all work, materials, and equipment against vandals and other unauthorized persons. No claim shall be made against the Owner by reason of any act of an employee or trespasser, and the Contractor shall make good all damage to the site resulting from his failure to provide security measures as specified.

### 3.0 FIELD OFFICES

This contract does not require that the Contractor provide a field office for the Engineer or Owner. However, the Contractor may provide an office for his own use.

## **5.0 LAYDOWN AREAS**

The Contractor shall establish laydown areas as he deems necessary to perform the work. These areas shall be located within the work area designated on the Contract plans. Laydown areas shall be maintained in a neat and orderly fashion, acceptable to the Engineer, and shall pose no nuisance to the public, such as odor or dust. Fencing of the laydown areas is the responsibility and at the discretion of the Contractor. If any additional laydown areas are needed by the Contractor, they shall be established by the Contractor at his cost. Laydown areas shall be restored to their original condition prior to completion of the project.

## **6.0 PROTECTION OF PUBLIC AND PRIVATE PROPERTY**

The Contractor shall be responsible for all damage to streets, roads, highways, shoulders, ditches, embankments, culverts, bridges, and other public or private property, regardless of location or character, which may be caused by transporting equipment, materials, or personnel to or from the site, whether by him or his subcontractors. The Contractor shall make satisfactory and acceptable arrangements with the owner of, or the agency or authority having jurisdiction over, the damaged property concerning its repair or replacement or payment of costs incurred in connection with the damage.

## **7.0 TREE AND PLANT PROTECTION**

Only trees and other vegetation shown within the limits of clearing on the Plans shall be removed and disposed of by the Contractor. All trees and plants not removed shall be protected against injury from construction operations, and shall not be endangered by stockpiling excavated material or storing equipment against the trunk.

## **8.0 PARKING**

The Contractor shall provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Project, as required to avoid any need for parking personal vehicles where they may interfere with public traffic or construction activities.

## **9.0 NOISE CONTROL**

The Contractor shall take reasonable measures to avoid unnecessary noise. Such measures shall be appropriate for the normal ambient sound levels in the area during working hours. All construction machinery and vehicles shall be equipped with practical sound-muffling devices, and operated in a manner to cause the least noise consistent with efficient performance of the work.

## **10.0 DUST CONTROL**

The Contractor shall take reasonable measures to prevent unnecessary dust. Earth surfaces subject to dusting shall be kept moist with water or by application of a chemical dust

suppressant approved by the Engineer. Dusty materials in piles or in transit shall be covered when practicable to prevent blowing.

#### **11.0 TEMPORARY DRAINAGE PROVISIONS**

The Contractor shall provide for the drainage of stormwater and such water as may be applied or discharged on the site in performance of the work. Drainage facilities shall be adequate to prevent damage to the work, the site, and adjacent property.

Existing drainage channels and conduits shall be cleaned, enlarged, or supplemented as necessary to carry all increased runoff attributable to the Contractor's operations. Dikes shall be constructed as necessary to divert increased runoff from entering adjacent property, except in natural channels, to protect the work and to direct water to drainage channels or conduits.

#### **12.0 POLLUTION CONTROL**

The Contractor shall prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. No sanitary wastes will be permitted to enter any drain or watercourse. Reasonable measures shall be taken to prevent sediment, debris, or other substances from entering any drain or watercourse.

#### **13.0 CLEANUP**

The Contractor shall provide containers for the collection and disposal of waste materials, debris and rubbish. The Contractor shall, at least weekly, dispose of such waste materials, debris and rubbish offsite.

The Contractor shall, at least weekly, brush sweep the driveway and all other streets affected by or adjacent to the site.

[END OF SECTION]

## **PERIMETER FENCE**

### **SECTION 02145**

#### **INDEX**

- 1.0 GENERAL**
- 2.0 MATERIALS**
- 3.0 CONSTRUCTION METHODS**

#### **1.0 GENERAL**

##### **1.1 Description**

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install the new chain link fence and gate as shown on the Contract Plans.
- B. The fence shall be 6 ft high with a top rail and bottom tension wire. The size of mesh shall be 2 in.
- C. The materials and installation noted in this section shall be in accordance with New York State Department of Transportation (NYSDOT) "Standard Specifications".
- D. If the Contractor damages any components of the existing fence, the Contractor shall repair or replace these components as directed by the Engineer at no cost to the Owner.

#### **2.0 MATERIALS**

##### **2.1 Fence Fabric**

- A. The galvanized steel fence fabric shall be specified in NYSDOT 710-02.

##### **2.2 Posts, Rails and Fittings**

- A. The galvanized steel posts, rails, braces and fittings for the chain link fence shall be Class A, Schedule 40 pipe as specified in NYSDOT 710-10.03.

##### **2.3 Concrete for Bases**

- A. The material for the concrete bases shall be as specified in NYSDOT 501.

**2.4 Fence Gate**

- A. The materials for the chain link fence gate shall be as specified in NYSDOT 607-2.03.
- B. The fence gate shall have a width of 3 ft.

**3.0 CONSTRUCTION METHODS**

**3.1 Construction Details**

- A. The chain link fence and gate shall be installed in accordance with NYSDOT 607-3.01, 3.02, 3.03 and 3.07.

[END OF SECTION]

## **EARTHWORK**

### **SECTION 02200**

#### **INDEX**

- 1.0 TRENCHING
- 2.0 EXCAVATION FOR STRUCTURES

#### **1.0 TRENCHING**

##### **1.1 Description**

Furnish all labor, materials, tools, and equipment necessary to completely do all excavation, backfilling, filling, and compacting work for underground utilities and their appurtenances to the lines and grades indicated on the Contract plans.

The Contractor shall excavate to the depths required. The slope of the sides of the excavation shall be consistent with the types of materials encountered. A clear area shall be maintained a sufficient distance back from the top edge of the excavation to avoid overloading which may cause slides, cave-ins, or shifting of the pipe.

All excavation shall be performed in accordance with OSHA "Construction Standards for Excavations," 29 CFR Part 1926, Subpart P.

##### **1.2 Trench Excavation**

Trenches shall not exceed the width for the proper laying of pipe as shown on the Contract plans.

The Contractor shall excavate the trenches to the proper profile required by the inverts shown on the Contract plans and providing a uniformly graded bottom surface. After approval of the trench bottom has been obtained from the Engineer, the pipe bedding material shall be installed on the trench bottom from wall to wall to the thickness shown on the Contract Drawings and shall be evenly graded to assure full bearing of the pipe throughout its entire length.

##### **1.3 Removal of Water**

Dewatering is specified in Subsection 2.7 of this section.

##### **1.4 Pipe Bedding**

Bedding, haunching, and initial backfill for piping shall consist of clean well graded sand.

a) Bedding

Prior to pipe installation, carefully bring the bedding material to grade along the entire length of pipe to be installed. No compaction is required due to the nature of the particles. If trench bottom conditions so warrant, more than 6 in. of bedding may be required.

b) Haunching

Carefully work, by hand, bedding from the edge of the trench up and under the pipe to support the haunches. Continue filling, by hand, to the top of the pipe.

c) Initial Backfill

Continue with bedding material to a depth of at least 6 in. above the top of the pipe.

## 1.5 Backfill Material

The backfill material shall be suitable earth taken from the excavations or an approved borrow site.

Compaction shall be performed in 6 in. lifts and compacted to the soil's optimum moisture content, as determined by the Engineer.

All material shall be free of stones larger than 4 inches in size. No organic material shall be allowed in any fill.

All fill materials used by the Contractor shall be approved by the Engineer before any fill is hauled to the site.

## 1.6 Grading

Grading shall be to the elevations as shown on the contract drawings or to existing.

The Engineer reserves the right to make minor adjustments or revisions in lines or grades if found necessary as the work progresses, in order to obtain satisfactory construction.

## 2.0 EXCAVATION FOR STRUCTURES

### 2.1 Description

Furnish all labor, materials, tools, and equipment necessary to completely do all excavation, backfilling, and grading work for structures to the lines and grades shown on the Contract plans and as specified herein.



Execute all work under this Section in a manner to prevent damage to structures, roads, utility lines, property monuments, bench marks, or other private or public property. It will be the responsibility of the Contractor to repair, at his cost, all damage which resulted from his operations.

All excavation shall be performed in accordance with OSHA "Construction Standards for Excavations," 29 CFR Part 1926, Subpart P.

## **2.2 Excavation for Structures**

The Contractor shall remove all materials to the lines, grades, and dimensions shown on the Contract plans and as necessary for construction and in such a manner that the undisturbed soils below and beyond the required excavation limits are preserved.

Excavation shall be made to such widths as will give suitable room for the construction of the structures, for bracing and supporting. The bottom of all excavations shall be firm, undisturbed and dry.

When the excavation for structures has reached the required depths, the Engineer shall be notified and will inspect the work.

During final excavation to subgrade level, the Contractor shall take whatever precautions are required to prevent disturbance and remolding of the subgrade. Material which has become softened and mixed with water shall be removed. The Engineer will be the sole judge as to whether the subgrade rendered is acceptable to proceed with the next stage of the work.

Fill shall not be placed on frozen surfaces or subsurfaces covered by snow or ice, nor shall snow, ice or frozen earth be incorporated in the fill or backfill.

Excavations shall be free from water at all times.

If the bottom of any excavation is overexcavated below the limits shown on the Contract plans and/or as specified without a written order by the Engineer to do so, it shall be refilled at the Contractor's expense with concrete, mixed in the same proportions as the footings to be supported.

## **2.3 Capillary Water Barrier**

A capillary water barrier shall be placed under all concrete slabs on ground. The barrier shall be constructed in layers of 4 in. to a total thickness of 12 in. Each layer shall be compacted individually with a minimum of two (2) passes of a hand operated plate type vibratory compactor or other equipment and methods approved by the Engineer.

The materials used for constructing the barrier shall consist of clean, nonporous, crushed gravel or uncrushed gravel meeting these requirements.

**U.S. STANDARD SIEVE SIZE**

**TOTAL % PASSING BY WEIGHT**

2 in.	100
1-1/2 in.	90-100
1 in.	20-55
3/4 in.	0-15
3/8 in.	0-5

**2.4 Filling Materials**

The following definitions shall apply to these specifications:

**Load Bearing Fill** - All approved fill used below foundations, slabs, or roadways.

**General Fill** - All other approved fill not defined as load bearing fill shall be general fill, used to construct the site to lines and grades shown on the drawings.

**Backfill** - All approved fill used against foundation walls, retaining walls, and in trenches and pits.

In addition, the following codes and standards shall apply to these specifications:

ASTM D 1557 - "Test Methods for Moisture Density Relations of Soils and Soil Aggregate Mixtures." Using a 10-lb rammer and in 18-in. drop (modified standard proctor).

AASHTO M145-73 - "Classification of Soils and Soil Aggregate Mixtures Class A-2-4."

The filling materials shall be suitable earth taken from the excavations or an approved borrow site.

Load bearing fill shall consist of select, well graded granular material. The plasticity index shall be less than 6 and the liquid limit less than 25.

The gradation shall be as follows:

<b><u>SIEVE SIZE</u></b>	<b><u>PERCENT PASSING BY WEIGHT</u></b>
2 in.	95-100
1 in.	85-100
#4	25-55
#10	15-40
#40	10-20
#200	2-10

The fraction passing the #200 sieve shall not be greater than 2/3 the fraction passing the #40 sieve.

All load bearing fill placed shall be compacted to at least 95% of the modified proctor maximum dry density, as defined by ASTM D1557.

General fill material shall meet class A-2-4 of AASHTO M145. The liquid limit shall be less than 40 and the plasticity index less than 10. There shall be less than 30% by weight of the material passing the #200 sieve.

Compaction shall be performed in 6 in. lifts and compacted to the soil's optimum moisture content, as determined by the Engineer.

All materials shall be free of stones larger than 4 in. in size. No organic material shall be allowed in any fill.

All fill materials used by the Contractor shall be approved by the Engineer before any fill is hauled to the site.

When backfilling, all compaction shall start at the face or side of a wall or footing in a direction away from such. A compaction run shall never work towards any wall or footing.

## **2.5 Grading**

Grading shall be to the elevations as shown on the Contract plans.

Unsuitable and excess excavated material shall be placed and spread where directed by the Engineer.

The Engineer reserves the right to make minor adjustments or revisions in lines or grades in found necessary as the work progresses, in order to obtain satisfactory construction.

## **2.6 Freezing Weather**

The following additional requirements shall apply to all fill materials.

The Contractor shall not place a layer of compacted fill on snow, ice, or soil that was permitted to freeze prior to compaction. Removal of these unsatisfactory materials will be required prior to fill placement.

## **2.7 Removal of Water**

The Contractor shall provide and maintain at all times ample means and devices with which to remove promptly and dispose of properly all water entering the excavation. Water shall be disposed of in a suitable manner without damage to adjacent property and without being a nuisance or a menace to public health and convenience. No water shall be drained into work

built or under construction without prior written consent of the Engineer. Additional requirements for water removal are specified in Section 01100.

[END OF SECTION]

# RECOVERY WELL CONSTRUCTION

## SECTION 02605

### INDEX

- 1.0 GENERAL
- 2.0 MATERIALS
- 3.0 INSTALLATION
- 4.0 WELL INTERNALS

### 1.0 GENERAL

#### 1.1 Summary of Work

The work covered by this section consists of the drilling, installation, and development of two recovery wells. Recovery Well RW-1S will be completed in the shallow underlying till deposits to depth of approximately 48 ft and RW-2D to a depth of 80 ft with completion in the underlying weathered bedrock as shown in the plans.

#### 1.2 Qualifications of Drillers

- A. When the Contractor submits the submittal register per Section 01340 of the specifications, he shall also indicate whether he will be using his own drill crew or subcontracting to a subcontract driller. The Contractor shall provide the name, address, and telephone number of the subcontract driller, and for either his own or subcontract drilling, qualifications to complete the work. Selection of the driller is subject to the approval of the Engineer. The terms "Contractor" and "Driller" in this section are synonymous; however, the Contractor shall be fully responsible for the work of subcontract driller.
- B. Equipment in first-class working order must be provided. The driller shall use his own drilling equipment, having the minimum capabilities necessary to do the described work. No unnecessary delays or work stoppages will be tolerated because of equipment failure. These will not be considered as valid reasons for extending the length of the contract. The Contractor shall be held responsible and payment may be withheld for damages to the well through any cause of negligence, faulty operation, or equipment failure.
- C. The driller shall employ only competent workmen expert in the performance of the type of work required by these specifications. The crew shall be under the direct supervision of an experienced driller; the driller shall provide the services of a drilling foreman, who shall be available to the job at all times. The crew and foreman shall be in the employ of the driller.

### **1.3 Codes and Standards**

- A. The Contractor shall at his own expense obtain all permits, certifications, and licenses required of him by law for the execution of the work, except as noted in Section 01060.
- B. The driller shall comply with all state and local laws, ordinances, or rules and regulations relating to the performance of the work.
- C. Where the provisions of the pertinent codes, standards, or regulations conflict with this Specification, the more stringent provisions shall govern.

### **1.4 Miscellaneous**

- A. Throughout the drilling and recovery well installation process, the well heads shall be protected from tampering at all times when the drilling crew is not present on site.
- B. In the event that a well cannot be used for its intended purpose, the Contractor shall abandon the well as directed by the Engineer, by removing and salvaging well casing materials and grouting the borehole with a cement-bentonite slurry. The cement-bentonite slurry shall be pressure grouted from the bottom of the borehole to ground surface by pumping the mixture through a tremie pipe.

### **1.5 Drilling Sites**

The drilling sites are depicted in the plans.

### **1.6 Local Geology**

The site is underlain by unconsolidated glacial till deposits and weathered bedrock which are in turn underlain by granitic gneiss bedrock. Appendix B contains geologic logs for two proximate monitoring wells: MW-5D and MW-11D.

## **2.0 MATERIALS**

### **2.1 Grout**

The borehole/casing annulus shall be grouted with a mix of five parts Portland Type I cement to three parts water to one part bentonite.

### **2.2 Casings and Well Screen**

The casings shall be 6 in. diameter ERW or seamless mild steel with a 0.25 in. thickness. The casings shall have beveled ends to allow for maximum weld penetration. The well screens shall be of continuous slot design, stainless steel Johnson or equivalent and approval by the Engineer.

The well screen shall be 6-in. diameter and approximately 40 ft long in RW-1S and 20 ft long in RW-2D. The exact length, and setting will be as designated by the Engineer. The screen slot size shall be 10 slot.

### 2.3 Centralizers

Centralizers shall be of the half moon steel strap type and shall be located at 0, 90, 180, and 270 degrees around the casing and screen assembly at the bottom of the screen; bottom of the casing, and within 5 ft of the top of the casing.

### 2.4 Filter Pack

The filter pack shall be a Morie No. 00N.

## 3.0 INSTALLATION

### 3.1 General

Recovery Well RW-1S shall be completed to a depth of approximately 48 ft below ground surface (bgs) in the overburden till materials. Recovery Well RW-2D shall be installed to a depth of approximately 80 ft bgs and shall be completed in the underlying weathered granitic bedrock. Approximate completion details are outlined below and in the plans:

RECOVERY WELL No.	DEPTH	SCREENED INTERVAL
RW-1S	48 ft	8-48 ft, bgs
RW-2D	80 ft	60-80 ft, bgs

### 3.2 Drilling

The conventional air-rotary method of drilling shall be employed. A 10-in. diameter borehole will be drilled to total depth and if necessary a 10-in. diameter casing can be driven to a required depth to keep the borehole open during the drilling process.

All down-hole equipment, including drill bits, drill pipe, split-spoon samplers, well screens and casings shall be steamed cleaned prior to use in the drilling and well installation process. Split spoon samplers will be decontaminated by the Engineer as per the RI Workplan for the site.

All water used during the drilling and well installation process can be obtained on site as noted in Section 02050.

Split-spoon samples shall be collected in advance of the drill bit at selected intervals in the drilling of Recovery Wells RW-1S and RW-2D. At a minimum split spoon samples shall be collected beginning at the 10 ft below grade at the RW-1S location and thereafter at 5-ft intervals to the final depth of the borehole. The frequency of sample collection may be modified based on direction by the Engineer. These samples shall be collected with a standard 2-ft long by 2-in. diameter sampler. The final screen interval for RW-1S will be based on the field observations and organic vapor analyzer screening of split spoon samples collected during drilling and on the till lithology.

It is anticipated based on prior drilling at the site that the screened interval for RW-2D will be in the weathered bedrock materials between 60 and 80 ft below ground surface. Final screen interval selection will be determined by the Engineer based on an examination of the drill cuttings and the screening of the split-spoon samples.

### **3.3 Well Construction**

- A. The recovery wells shall be constructed using 6-in. diameter mild steel casing and stainless steel well screen. The well screen slot size openings will be determined by the Engineer prior to the Contractor's mobilization to the site.
- B. Clean silica sand (filter pack) shall be emplaced from the bottom of the well screen to at least 5 ft above the top of the well screen. After the installation of the filter pack, pre well development activities shall be carried out by gently pumping the well(s) with a submersible pump while checking the casing/borehole annulus to insure that the filter pack has settled.
- C. Following the pre-development, the casing/borehole annulus shall be pressure grouted with a cement/bentonite mixture using a tremie pipe from the top of the filter pack materials to ground surface.
- D. The wellheads shall be completed as shown in the plans. Until the wellhead construction is completed, the wellheads shall be secured with sanitary seals.

### **3.4 Well Development**

Well development shall initially be carried out by pumping very gently with a submersible pump, followed by further development with a submersible pump and/or use of a surge block with intermittent pumping. The Contractor shall be prepared for both development methods.

### **3.5 Health and Safety**

Refer to Section 01730. The Contractor must be prepared to quickly upgrade to Level C, if needed, in order to complete without interruption the work included in this Section.

### **3.6 Cuttings and Fluid Handling**

Refer to Section 01100.



### **3.7 Driller Records**

The driller shall maintain detailed log of operations during all drilling procedures. The log shall provide a complete description of all formations encountered, size of hole drilled, depth sizes of casing and screens installed, a description of cementing operations and other such pertinent data. A copy of the log shall be submitted to the Engineer.

## **4.0 WELL INTERNALS**

### **4.1 General**

The Contractor shall furnish all equipment, labor, materials, and incidentals required for the installation of stainless steel submersible pumps, torque arrestors, risers, pitless adaptors, and fittings in recovery wells RW-1S and RW-1D. The work covered by Subsection 4.0 does not have to be completed by a driller.

### **4.2 Submittals**

The Contractor shall submit drawings and material cut sheets in conformance with Section 01340 for the following:

- well pumps and motors
- pitless adaptors
- torque arrestors
- arrangement of all fittings and piping connecting the pump outlet to the pitless adaptor

### **4.3 Materials**

#### **A. Well Pump and Motor**

The well pump and motor shall be a Grundfos, Redi-Flo 4, Model 5E5. Pump shall have a cooling shroud around the unit to induce water to surround the pump motor for cooling.

#### **B. Pitless Adaptor**

1. The pitless adaptor shall be of a configuration and design to allow easy removal of the pump, motor, riser, torque arrestor, and control cables from the well. The adaptor shall have passed certified watertight standards PAS-1 established and regulated for the industry by the Pitless Adaptor Division of the Water System Council. The pitless adaptor shall be designed to support the full length of riser pipe full of water, pump, motor, and other internals of the well. The pitless adaptor shall be designed specifically to attach to the well casing diameters specified.

2. The pitless adaptor shall be fabricated of brass except for O-rings and gaskets.
3. The pitless adaptor shall have a nominal 1-in. diameter drop and discharge.
4. The Contractor shall provide a galvanized steel T-puller that will mate with the pitless adaptor to allow withdrawal of the pump and well internals.

**C. Torque Arrestor**

1. The torque arrestor shall be installed directly above the submersible pump.
2. The torque arrestor shall be designed to protect the submersible pump from starting torque damage and shall allow a safety rope and wire to pass by.

**D. Pump Discharge Line**

The pump discharge line (riser) shall be schedule 80, polyethylene pipe, as specified in Section 15200, diameter as shown in the Plans.

**4.4 Installation**

- A. Contractor shall furnish all equipment, labor, materials, and incidentals required for the installation of submersible pumps, pitless adaptors, torque arrestors, fittings, and piping necessary for a groundwater pumping system and as specified and in the plans.
- B. All equipment shall be set, leveled, and aligned in strict accordance with the manufacturer's instructions.
- C. All openings to accommodate discharge piping shall be effectively sealed against entrance of water under all conditions of vibration or movement of cables.
- D. The installation for the pumping wells shall be made with all necessary pipe, couplings, cable, water level indicators, safety line, etc., as required for a complete pumping unit. Provisions shall be made for all disconnects so as to facilitate future motor and pump removals.
- E. The pump shall be secured with a safety rope as shown in the plans and as recommended by the pump manufacturer.

[END OF SECTION]

**CONCRETE**  
**SECTION 03300**

**INDEX**

- 1.0 DESCRIPTION
- 2.0 CODES
- 3.0 MATERIALS
- 4.0 CONCRETE STRENGTH AND QUALITY
- 5.0 TESTING AND QUALITY CONTROL OF CONCRETE
- 6.0 FORMWORK
- 7.0 REINFORCING STEEL
- 8.0 PLACEMENT OF CONCRETE
- 9.0 CURING
- 10.0 COLD WEATHER CONCRETING
- 11.0 JOINTS
- 12.0 FINISHING
- 13.0 GROUTING
- 14.0 PRECAST CONCRETE

**1.0 DESCRIPTION**

The Contractor shall furnish all labor, materials, equipment, and incidentals required to construct all concrete items as stated in this specification and shown on the Contract Drawings.

The concrete work shall include all footings, grade walls, slabs, equipment foundations and miscellaneous structural components.

The Contractor shall place all concrete, reinforcing steel, forms, waterstops, grouting, floor and wall sleeves, and anchor bolts.

The Contractor shall submit shop drawings showing placement of all joints and other details to the Engineer for approval. The Contractor shall also submit the proposed mix design including the composition of the aggregates and identify the concrete supplier. The Contractor shall submit placing and bending details for all reinforcing bar.

The Contractor shall also furnish certified mill test for the steel reinforcing to be used. The Contractor shall submit literature describing all waterstops, adhesives, grout, floor hardener, and other materials, including installation instructions.

**2.0 CODES**

The design and construction of the concrete shall be in accordance with American Concrete Institute (ACI) "Building Code Requirements for Reinforced Concrete," ACI-318,

"Specifications for Structural Concrete for Buildings," ACI-301, and "Concrete Sanitary Engineering Structures," ACI-350R, latest editions.

The Contractor shall be responsible for carrying out all construction procedures in accordance with all local and state governing codes, including Occupational Safety and Health Act (OSHA) rules.

### **3.0 MATERIALS**

The cement to be used shall be domestic Portland cement, Type II. The cement used shall be in accordance with ASTM Specifications C-150.

The aggregates to be used shall be clean, hard, durable and conform to ASTM Specification C-33.

The maximum size of the aggregate shall be 1/5 the narrowest dimension between side forms, 1/3 the depth of slabs or 3/4 of the minimum clear spacing between individual reinforcing bars.

Water used in mixing concrete shall be clean and free from deleterious amounts of acids, alkalies or organic materials.

All steel reinforcing shall conform to ASTM Specification A-615, Grade 60. The steel shall be new rolled stock of domestic manufacture, substantially free of mill scale, rust, dirt, grease, and other foreign matter.

All reinforcing steel delivered to the site shall be properly secured and bundled. The steel shall be stored off the ground and protected from the weather.

All ready-mix concrete shall conform to ASTM Specification C-94.

The concrete shall contain an air-entraining admixture conforming to ASTM Specification C-260. The admixture shall be Sika AER as manufactured by Sika Chemical Corporation, Dairevair, by W.R. Grace & Co., or an approved equal.

Water-reducing agents added at the site shall be used only if approved by the Engineer.

The dosage of admixtures shall be as recommended by the manufacturer.

Any other admixtures to be used shall be approved by the Engineer, in advance of its use. Floor hardener and grout shall be approved by the Engineer, in advance of their use, as specified in Sections 12.0 and 13.0, respectively.

### **4.0 CONCRETE STRENGTH AND QUALITY**

The Contractor is responsible for the mix design and the proportions of materials to be used. The mix submitted shall be designed in accordance with ACI 318-89.

All concrete shall have a compressive strength of 4000 psi after 28 days and a maximum water/cement ratio of 0.47.

The proportions of aggregate to cement for any concrete to be used shall produce a mix that will work readily in corners and angles of forms and around reinforcing, without permitting segregation of materials or excess free water to collect on surfaces.

The combined aggregates shall be of such a composition that when separated on a number 4 standard sieve, the weight passing the sieve shall not be less than 30 or more than 50%.

The method of measuring the concrete material shall be by weight and shall be accurately controlled and easily checked.

All concrete shall have entrained air of 3 to 5%.

## **5.0 TESTING AND QUALITY CONTROL OF CONCRETE**

The Contractor shall advise the Engineer at least 24 hours prior to each concrete placement. The Engineer will inspect the reinforcing and the alignment and tightness of formwork. No placement shall be made without the Engineer's approval.

Discharge of concrete at the site shall be within 1-1/2 hours after the cement was first introduced to the aggregate or within one hour after water has been introduced to the mix. Agitation shall begin immediately after the concrete is placed in the truck and shall continue without interruption until discharge.

The retempering of concrete that has partially hardened, will not be permitted. Such concrete will be rejected and shall be disposed of off the site.

During the placing of concrete, compression specimens shall be taken at random by an approved independent testing laboratory. The cylinder specimens shall be taken and cured in accordance with ASTM Specification C-31.

No less than two specimens shall be taken for each test. One test set of cylinders shall be prepared for each day concrete is placed. The cylinders shall be identified as to where the concrete was placed. The specimens shall be cured at the laboratory. The concrete specimens shall be tested at seven days and 28 days or as directed by the Engineer.

During the placing of concrete the consistency of the concrete shall be determined in accordance with a slump test. The slump tests shall be performed in accordance with ASTM Specification C-143. The slump tests shall be taken by an approved independent testing laboratory.

The slump in inches for vibrated concrete shall fall within the following limits:

<u>TYPE OF STRUCTURE</u>	<u>MINIMUM</u>	<u>MAXIMUM</u>
Footings	2 inches	5 inches
Slabs	2 inches	3 inches

The Contractor shall cooperate in the making of all tests to the extent of allowing free access to the site for the taking of samples, and affording protection of the specimens against damage or loss.

The Engineer shall furnish copies of the test results to the Contractor.

When the tests on the specimens of concrete fall below the required 28-day compressive strength limit, the Engineer may order check tests to be made by means of drilled cores to be performed in accordance with ASTM Specifications C-42 and C-39 or other nondestructive tests such as Windsor probe. These tests will be performed by an approved independent testing laboratory.

Should the strength of the drilled cores fall below the required 28-day compressive strength limit, the concrete shall be rejected and shall be removed and disposed of off site and replaced by the Contractor at no additional cost to NJDEPE. The Engineer will also bill the Contractor for the cost of the drilled cores.

## 6.0 FORMWORK

The formwork shall be at the Contractor's discretion. The design and construction of the formwork shall be the Contractor's responsibility, however it shall conform to all the requirements of ACI-347. "Recommended Practice for Concrete Formwork."

The forms shall be constructed and placed so that the resulting concrete will be of the shape, lines, dimensions and appearance, and to the elevations indicated on the Contract Drawings and as specified.

Forms shall be rigid and properly braced and tied together to withstand vibration, prevent displacement or sagging between supports, and withstand the pressures of wet concrete.

All forms shall be free of all debris and standing water before concrete is placed.

Forms shall not be removed until the concrete has hardened sufficiently to safely support its own load plus any superimposed loads that might be placed on them. Forms shall not be removed from:

- a. Beam, slabs and other members subject to bending stress for a minimum of seven days.

- b. Walls and grade beams, not subjected to superimposed loads, for a minimum three days. In cold weather (below 50°F) forms shall be left in place 1.5 times longer than as specified above.

Special care shall be taken in removing forms, shores, supports, and form ties to avoid spalling or marring the concrete. Form ties shall be broken back immediately after removing the forms. The holes left shall be filled promptly with mortar and the surface finished with a steel trowel.

## 7.0 REINFORCING STEEL

Bending diagrams and reinforcing details shall conform to ACI-315, "Manual of Standard Practice for Detailing Reinforced Concrete Structures" and ACI-318, "Building Code Requirements for Reinforced Concrete."

Concrete reinforcement shall be deformed steel bars of the sizes indicated on the Contract Drawings. All reinforcing bars shall be bent cold. Bars of a single length shall be used in all cases.

No reinforcing bars shall be welded either during fabrication or erection without prior written approval from the Engineer. All bars that have been welded, including tack welds, without such approval shall be removed and replaced at no additional cost to the Owner.

Where splices in reinforcement are necessary the splices shall be staggered so that not more than one half of the splices occur in the required lap length. The length of all splices is to be 36 bar diameters unless otherwise noted. Where all splices must occur at one point, the splice length shall be increased to 52 bar diameters.

All steel reinforcement shall be carefully placed and fastened in position so as to maintain the proper spacing between adjacent bars and to prevent the bars from becoming displaced during the placing of concrete.

Reinforcement shall be installed with clearance for concrete cover as follows unless noted on the drawings:

- a. Concrete cast against earth - 3 inches
- b. Concrete exposed to earth or weather after removal of forms - 2 inches
- c. Concrete slabs not exposed to weather or earth - 1 inch
- d. Concrete beams or columns - 1-1/2 inches to ties, stirrups or principal steel

Reinforcing bar supports shall be sufficient in number and strength to support the steel they carry the use of commercial concrete bricks will not be permitted.

Metal chairs shall be used where concrete is poured on earth, rock, or foundation cushion covered with polyethylene film. The tolerance for placing reinforcing steel in the forms shall be  $\pm 1/4$  inch. Nails shall not be driven into the outside of forms to support reinforcement.

## 8.0 PLACEMENT OF CONCRETE

The Contractor shall not place concrete until all forms, embedded items, and steel reinforcement have been approved by the Engineer.

To ensure proper bonding, when new and previously placed concrete are joined, the contact surfaces shall be thoroughly cleaned by means of stiff brushes or other tools to remove laitance, loose or defective concrete and all other foreign material. The surface shall be clean and wet, but free from pools of water.

No concrete shall be placed on frozen soil, and adequate protection against freezing weather shall be taken by the Contractor.

The transport of concrete from mixer to final deposit shall be as rapid as practicable by methods that prevent separation of ingredients and displacement of reinforcement.

Once a concrete pour has begun it shall be continuous until the placement of the section is complete.

Concrete shall be compacted during the pour by means of suitable tools. Internal-type mechanical vibrators shall be used by experienced operators to produce homogeneity and optimum consolidation without segregation. All vibrators shall run at least 10,000 vibrations per minutes.

## 9.0 CURING

Concrete shall be protected from rain, flowing water, and damage. Walking shall not be permitted on fresh concrete until it has set for a sufficient time. Projecting reinforcement or inserts shall also be protected. Fresh concrete shall also be protected from staining or marring of surfaces.

Concrete shall be cured for a period of not less than seven days. The recommended procedure is to use burlap laid over the concrete as soon as it is sufficiently hard to withstand surface damage. The covering shall be kept continuously moist (not periodically) throughout the curing period. Vertical formed surfaces shall be wetted prior to form removal by applying water on the uniformed top surface and allowing water to pass down between the form and the concrete face. Other curing methods may be substituted with the Engineer's approval. This approval must be obtained in writing prior to any concrete pour.



## 10.0 COLD WEATHER CONCRETING

Cold weather concreting shall be in accordance with ACI-306 "Recommended Practice for Cold Weather Concreting." Ordinary concrete shall be mixed and placed only when the temperature is at least 40°F and rising. In freezing weather, suitable means shall be provided for maintaining the concrete at a temperature of at least 50°F for not less than 72 hours after placing. Salt, calcium chloride or other materials shall not be mixed with the concrete for the purpose of preventing freezing. The Contractor shall make his own estimate of the amount of cold weather work necessary to complete the work in the time prescribed and the cost included in the contract price. No extra payment will be made for preparing placing and protecting the concrete in cold weather.

## 11.0 JOINTS

Where shown on the Contract Drawings expansion joints shall be provided with a polyvinyl chloride waterstop with elastic filler. Exposed joints in slabs shall be finished with a joint sealer. The expansion joints shall be preformed as shown on the Contract Drawings.

Where shown on the Contract Drawings control joints shall be provided with a polyvinyl chloride waterstop. The control joint shall be preformed as shown on the Contract Drawings.

The installation of waterstops shall be made in accordance with the manufacturer's recommended procedure. Concrete surfaces shall be clean and free of excess moisture before any adhesive or elastic filler is applied.

## 12.0 FINISHING

When the forms have been stripped all fins and other projections shall be removed, recesses left by the removal of form ties shall be filled flush, and surface defects that do not impair structural strength shall be repaired and finished. Slight honeycombing and minor defects shall be patched with cement mortar of the same source as the original concrete.

Exposed concrete surfaces other than floors and slabs shall have fins and other projections removed, offsets leveled and damaged places repaired. The surfaces shall then be rubbed with cement or carborundum bricks and water. No mortar or grout shall be used in the rubbing. Forms marks and other blemishes shall be removed, leaving the surface smooth and clean.

The outdoor slab shall receive a broom finish. The surface shall first be given a float finish. Before the concrete has hardened appreciably it shall be broomed in the direction of slope with a hard bristle push broom. Brooming shall be a continuous operation with the broom passing over the concrete in smooth straight lines.

The floor within the building, the top surface of all curbs and the top surface of all equipment foundation pads shall receive a trowel finish. The surface shall first be given a float finish. The float finish shall be followed by hand troweling with steel trowels. Troweling shall not

start until all water has disappeared from the surface. Dusting with dry cement or sprinkling with water will not be permitted during finishing.

The floor within the building, shall be finished with a minimum of three coats of concrete floor hardener. The hardener shall be applied in accordance with the manufacturers instructions. The floor hardener shall be approved by the Engineer.

### **13.0 GROUTING**

The Contractor shall furnish all labor and materials required to grout all anchor bolts and equipment base plates.

Dry pack grout shall consist of fine aggregate that shall be clean, sharp silica sand, well graded and containing a good distribution of sizes. The fineness modulus shall be between 2.8 and 3.2. Portland cement shall conform to ASTM C-150, Type II. The water shall be clean, portable and free of alkalis, acids or organics. No admixtures shall be permitted. Grout shall be approved by the Engineer.

The Contractor shall remove all defective concrete from the foundation to provide a firm, rough surface free of dirt, oil, grease, paint and dust. The Contractor shall also clean the underside of base plates and all bolts.

All equipment shall be set in place and aligned in its proper position prior to grouting. Any leveling shims which are to be removed after the grout has set should be coated with a thin film of grease to facilitate removal. The foundations shall be saturated prior to grouting.

Dry pack grout shall consist of one part cement and two parts sand. The grout shall have a slump of 0 inches. The grout shall be placed in small amounts and thoroughly compacted. After the grout has been placed, the exposed areas shall be covered with burlap and kept wet for three days. The minimum temperature permitted during grouting is 50°F.

### **14.0 PRECAST CONCRETE**

Precast concrete structures shall be constructed using the same codes, materials, and placing procedures as outlined in this section. In addition, the precast concrete shall be manufactured by a vendor with three years' or more experience at a plant specifically established for the manufacture of precast concrete of the type required.

The Contractor shall furnish and install two (2) precast concrete chambers, as shown on the Contract Plans. The chambers shall be reinforced as per the manufacturers standard. The concrete shall have a 28-day compressive strength of 4000 psi. The chambers shall be complete with sleeved openings for pipes. These openings shall be caulked and grouted by the Contractor.

[END OF SECTION]

# PERIMETER INSULATION AND VAPOR BARRIER

## SECTION 07200

### INDEX

- 1.0 DESCRIPTION
- 2.0 SUBMITTALS
- 3.0 MATERIALS
- 4.0 INSTALLATION

### 1.0 DESCRIPTION

Furnish all labor, materials, equipment, and incidentals required to install perimeter insulation and vapor barrier as shown on the contract drawings and specified herein.

### 2.0 SUBMITTALS

The Contractor shall submit shop drawings showing details of installation and descriptive literature of all materials specified herein.

The Contractor shall submit for approval representative samples of all materials specified herein.

### 3.0 MATERIALS

Perimeter Insulation shall be 2 inch insulation board having an aged thermal resistance  $R=16$  at 40°F. The insulation shall be approved by the Engineer.

Adhesive for application of perimeter insulation shall be as recommended by the insulation manufacturer.

### 4.0 INSTALLATION

#### 4.1 Perimeter Insulation

The Contractor shall install perimeter insulation around the inside of the foundation walls and under the floor slab of the building.

Insulation shall be held firmly in place against concrete with daubs of mastic in accordance with the manufacturer's instructions and shall extend down from the bottom of the slab to the top of the footing.

Insulation shall be protected from damage during backfilling and compacting operations.

#### **4.2 Polyethylene Vapor Barrier**

A 6 mil polyethylene vapor barrier shall be installed under the building slab on grade.

Vapor barrier shall be applied directly over capillary water barrier.

All sides and ends shall be lapped 6 inches. Sheets shall be offset so that there are three thicknesses at sheet corners.

Vapor barrier sheet shall be weighted down as required to prevent their being displaced by construction activity or wind.

In order to minimize damage to the vapor barrier it shall be placed as shortly prior to concrete pour as practicable.

[END OF SECTION]

# **SUPERSTRUCTURE FOR TREATMENT BUILDING**

## **SECTION 13120**

### **INDEX**

- 1.0 GENERAL**
- 2.0 RELATED WORK DESCRIBED ELSEWHERE**
- 3.0 QUALIFICATIONS**
- 4.0 SUBMITTALS**
- 5.0 DELIVERY**
- 6.0 DESIGN CRITERIA**

### **1.0 GENERAL**

- 1.1. Furnish all labor, equipment and materials required to erect, install and paint, complete and ready to operate a superstructure at the location and to the dimensions shown on the Contract plans and which is hereinafter referred to as the Treatment Building.
- 1.2. The building shall be supplied complete with all necessary component parts, including foundation anchors, to form a complete building system and all parts shall be new and free from all defects or imperfections.
- 1.3. The building width and length shall be measured from the outside of the building wall panels and the height of the building shall be the distance measured from the bottom surface of the base channel to the exterior juncture of the roof and sidewall panels.
- 1.4. The building shall be as manufactured by Parkline, Inc., Winfield, W.V., or equal.

### **2.0 RELATED WORK DESCRIBED ELSEWHERE**

- 2.1. Foundations and floor slab for the Treatment Building shall be provided by the Contractor under other sections of these Specifications.
- 2.2. Electrical equipment inside the Treatment Building, power, control, lighting, instrumentation, powering the heating and ventilating work, and grounding shall be performed under Section 16001 - ELECTRICAL WORK.
- 2.3. Heating and ventilating shall be performed under Section 16001 - ELECTRICAL WORK.

### **3.0 QUALIFICATIONS**

- 3.1. The structure covered by these Specifications shall be the product of a reputable, qualified, and successful manufacturers who are of proven ability and have long experience in the production of such structures.
- 3.2. The listing of a manufacturer or Model No. for the structure does not constitute a waiver of other specification requirements of this section.

### **4.0 SUBMITTALS**

- 4.1. Contractor shall furnish Shop Drawings for the structure, showing the method of erection and step-by-step erection procedure manual illustrating the construction sequence for the erection of the building.

### **5.0 DELIVERY**

- 5.1. The size and weight of the building components shall permit easy handling by two men without the need of power equipment. All components shall be adequately protected for shipment by commercial carriers.
- 5.2. Each piece, including roof and wall panels, shall be individually marked to correspond with the building erection drawings.

### **6.0 DESIGN CRITERIA**

- 6.1. The building shall be designed in accordance with the applicable sections of the latest edition of the AISC "Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings: and the AISI "Specifications for the Design for Light Gauge Cold Formed Steel Structural Members".
- 6.2. The building shall be designed for the following loads, in addition to the stationary weight of the building. Reduction of loads due to tributary loaded areas will not be permitted.
  - A. The vertical Live Load of the building shall not be less than 30 pounds per square foot applied on the horizontal projection of the roof.
  - B. The horizontal Wind Load of the building shall not be less than 20 pounds per square foot and shall be distributed and applied in accordance with the applicable edition of the Metal Building Manufacturers Association (MBMA) publication titled "Low Rise Building Systems".

- C. All combining and distributing of auxiliary equipment loads imposed on the building system shall be done in accordance with the applicable section of the MBMA publication titled "Low Rise Building Systems".

### 6.3. Building Type

- A. The building shall have a roof with a minimum slope of 1 1/2 in. in full building width. Roof panels shall be interlocking and attached to the wall cap through factory punched holes with #14 corrosion resistant fasteners.
- B. If required, angle or channel bracing components shall be placed across the building width to allow transmission of the horizontal wind loads. All wind bracing components shall be of 14 gauge steel with minimum Grade G40 galvanized coating.
- C. Where required for proper transmission of lateral wind loads, structural frame wind bents shall be installed. Wind bents shall consist of a bolted column and rafter assembly made of steel conforming to ASTM A-36 specifications.
- D. The interlocking panel roof system shall extend a minimum of 6 in. over the sidewall panels of the building.
- E. The building roof line shall be furnished with minimum 24 gauge factory painted rake and gutter trim. Color of rake trim and cornices shall be Arctic White.

### 6.4. Roof Panel Design

- A. Roof panels shall be supplied in a single continuous length from eave line to ridge line and shall be designed to interlock tightly so that no fasteners are required at intermediate points along the panel side laps.
- B. Roof panels shall be 16 in. wide with a flat surface between the interlocking side ribs. The interlocking ribs shall be a minimum 3 in. high, and shall be turned upward. All roof panels shall be factory punched for connection at the eave line of the building.
- C. Roof panels shall be minimum 24 gauge steel coated on both sides with a coating of corrosion resistant aluminum zinc alloy applied by a continuous hot dipping process. Minimum yield strength of panel material shall be 50,000 psi.
- D. There shall be no fastener penetrations through the roof covering except at eave lines. The ceiling system shall be supported at its perimeter by concealed angles and hook bolts.

## 6.5. Roof Insulation

The ceiling shall be insulated with 16" wide by 3" thick unfaced fiberglass insulation laid at right angles to the panel ribs. The "U" value through the finished ceiling shall be a maximum of 0.09 BTU's per square foot when measured in accordance with the "Zone Method" contained in ASHRAE "Handbook of Fundamentals", 1972 edition.

## 6.6. Wall Panel Design

- A. Exterior wall panels of the building shall be a single continuous length from the base channel to the roof line of the building at the sidewalls and endwalls of the building except where interrupted by wall openings.
- B. Wall panels shall be 16 in. wide with a 3 in. deep inward turned interlocking side rib. Wall panels shall contain two 3/4 in. deep by 3-1/8 in. wide fluted recesses, each starting 2-7/16 in. from the panel edge.
- C. Wall panels shall be fastened internally to the base channel and eave cap of the building with 3/8 in. diameter electro galvanized machine bolts placed within the panel interlock. The fastening system shall be designed so that no wall fasteners are exposed on the exterior surface of the walls.
- D. Wall panels shall be minimum 24 gauge galvanized steel conforming to ASTM A-525 specifications with the galvanized coating conforming to G90 (1-1/4 oz) standards. Minimum yield strength of panel material shall be 40,000 PSI. Panel material shall be embossed with a random pattern pebble embossure of approximately 0.007 - 0.008 depth.
- E. All exterior surfaces of the galvanized steel wall covering and exterior trim shall receive a factory, roller applied paint coating having an exterior coating thickness of 0.8 to 1.2 mils of dry film thickness. The finish coat for wall panels shall be a siliconized polyester formulation of the following Parkline color: Desert Tan.
- F. The wall panel color coating shall carry a low fire hazard rating equal to a Class 1 material as defined by Factory Mutual. The panel coating shall have achieved a Flame Spread Index of 25 or less and a Fuel Contributed Index of 100 or less when tested in accordance with ASTM E-84 test procedures.
- G. Exterior color coatings shall meet the following performance standards after 10 years continuous exposure in "normal" vertical atmospheric conditions.

Panels shall show no evidence of blistering, peeling, or chipping.

Panels shall not show surface chalking in excess of the No. 8 rating D659-44 as established by the American Society of Testing Materials (ASTM).



Panels, after cleaning, shall not show color change in excess of five (5) NBS units when measured in accordance with the ASTM-D-2244-85 standard.

- H. Rib stiffener columns shall be installed to support the control panel in the location shown on the Contract Plans.

#### 6.7. Wall Liner

- A. Interior liner panels shall have a maximum coverage width of 32" and overlap with the adjoining liner panel. The interior surface shall have 1/4" high x 1" wide ribs on 8" centers. The liner shall be continuous length from base to eave except where interrupted by interior girts or wall accessories.
- B. Panels shall be rollformed of 26 gauge galvanized steel, prepainted arctic white.
- C. The interior liner panels shall be fastened to the exterior wall panel with #8 self drilling fasteners, prepainted white to match the liner.
- D. The liner system shall be furnished complete with matching base moulding and trim.
- E. The void between the exterior wall panel and the interior liner shall be insulated with 3" thick unfaced fiberglass insulation. A one in. wide thermal tape shall be applied to the exterior panel ribs to abate thermal bridging between joints. The "U" value of the assembled wall system shall be a maximum of 0.16 BTU's per square foot when measured in accordance with ASTM-C-236.

#### 6.8. Hollow Metal Doors

- A. The door shall be of hollow metal construction, 1-3/4 in. thick flush type. Door panels shall be minimum 20 gauge galvanized steel reinforced by lamination to a honeycomb core enclosed with a continuous steel perimeter channel. The hinge edge channel shall be minimum 7 gauge and lock edge channel shall be minimum 16 gauge. Door panels shall be projection welded to the perimeter channel on maximum 5 in. centers.
- B. Door frames shall be 4-3/4 in. deep double rabbeted type of minimum 16 gauge galvanized steel.
- C. Doors and frames shall be factory painted with one coat of baked on primer. All doors shall be preassembled in their frames and hardware installed and tested prior to shipment.
- D. The door size shall be as shown on the Plans.

## 6.9. Door Hardware

### A. Door hardware shall consist of:

(3) - 4-1/2" x 4-1/2" steel hinges per ANSI #A81232 US26D (626) Satin Chrome Finish with nonremovable pins.

1 - 3-11/16" wide x 5/8" high x width of door extruded aluminum threshold.

3/16" x 1/2" polyurethane and vinyl weatherstripping.

1 - Mortise cylinder lockset per ANSI A156.13, Series 100, Grade 1, Function F13, US26D Satin Chrome Finish.

## 6.10. Adjustable Wall Louver

A. Adjustable louver shall be general purpose type of self framing design. The louver frame shall be of minimum 14 gauge formed aluminum and the louver blades shall be minimum 12 gauge extruded aluminum. Finish shall be natural mill finish and shall not require field painting.

B. Blades shall be pivoted on 1/2" diameter aluminum pivot pins through nylon flanged bearings and operated by means of a pull bar operating handle. All louvers shall be complete with an exterior mounted 18 - 14 aluminum mesh insect screen.

C. Louver size shall be as shown on the Drawings.

[END OF SECTION]

## MECHANICAL

### SECTION 15100

#### INDEX

- 1.0 PIPING
- 2.0 PIPE HANGERS AND SUPPORTS
- 3.0 VALVES

#### 1.0 PIPING

##### 1.1 Pipe Schedule

The following schedule denotes the various pipe materials that shall be installed for diverse services.

SERVICE	MATERIAL	WORKING PRESSURE	TEST PRESSURE
Well discharge pipes	Polyethylene coil pipe	110 psi	150 psi
Treatment building pipes	PVC pressure rated pipe	125 psi	250 psi
Treated effluent pipe	Polyethylene coil pipe	110 psi	150 psi

##### 1.2 Polyethylene Pipe

The polyethylene pipe shall be Type III, Class C, Category 5, Grade P34 according to ASTM D1248. The cell classification shall be in accordance with ASTM D3350.

The wall thickness shall be based on an SDR of 9, or as needed to provide an allowable working pressure of 170 PSI, for water at 70°F.

Fittings shall be produced from the same polyethylene compounds used in the manufacture of the pipe.

The pipe shall be extra high molecular weight, high-density polyethylene as approved by the Engineer.

Flange joints shall have backup flanges as recommended by the manufacturer. Flanges and bolt patterns shall be as specified by the manufacturer.

Polyethylene pipe shall be joined by leakproof, thermal, butt or socket fusion joints. All fusion must be done by qualified installers in compliance with the regulations of the Department of Transportation, Materials Transportation Bureau, contained in the Code of Federal Regulations Title 49 Part 192. Section 192.285 of these regulations details the procedure to be used to qualify persons to join plastic pipe. The joints to be made for qualifications shall be made in strict accordance with the manufacturers procedure and shall have the same visual appearance as correctly made fusion joints as described and illustrated in the manufacturers literature.

Tools used for joining polyethylene pipe shall be approved by the pipe supplier and the Engineer.

### 1.3 PVC Pipe

Where PVC pipe is called for in these specifications or on the Plans, it shall be rigid Schedule 80 unplasticized polyvinyl chloride pipe. PVC pipe shall conform to the requirements of ASTM D1785 Class 12454B (formerly Type 1, Grade 1) as well as to the requirements of Commercial Standard CS207. All PVC pipe shall be produced by a continuous extrusion process employing a prime grade of unplasticized polyvinyl chloride compound which shall meet or surpass all requirements for Class 12454B polyvinyl chloride of the "Specification for Rigid Poly (vinyl) Chloride compounds," ASTM D1784. The pipe material shall have an assigned design stress of 2000 psi, as recommended by the Hydrostatic Design Stress Committee of the Plastic Pipe Institute. All exterior PVC pipe that will be subject to sunlight exposure after installation shall be of the ultraviolet stabilized type and shall be white.

Fittings used with PVC pipe shall have all the physical properties and characteristics of the pipe specified above. Each fitting shall be extruded to the high uniform quality and strength and to the proper size required in the fabricated systems. Fittings shall be solvent welded in accordance with manufacturer's instructions.

Provisions shall be made for expansion in all PVC pipe. Straight runs of pipe that are not buried shall be provided with one expansion coupling for runs over 20 ft in length. An expansion coupling shall be installed at each building expansion joint. The expansion coupling shall have a minimum travel of 4 1/2 in. and shall be installed with the coupling opened to one half its travel. The pipe shall be anchored in an approved manner on one side of each expansion coupling. Where an unanchored section of pipe has a bend at the end, the pipe shall also be anchored at the bend. Expansion couplings shall be Heavy Duty Type Machined Expansion Joints with socket ends for Schedule 80 pipe as approved by the Engineer.

### 1.4 Cleaning and Testing

At the completion of the work and prior to final acceptance, all parts of the work installed under this section of these specifications shall be thoroughly cleaned. All piping shall be cleaned of grease, metal cuttings, dirt, and all other foreign materials which may have entered the various systems.

Prior to acceptance, the Contractor shall inspect and test each piping system in the presence of the Engineer. The Contractor shall supply all gases or fluids, gauges, meters, and other equipment necessary for testing.

Each joint of the piping systems tested with air or inert gas shall be proven tight by swabbing with a soap solution or other equally effective means.

All defects revealed by the tests shall be made good with new material without cost to the Owner. Tests and repairs shall be continued until all tests requirements have been met.

All testing of piping systems shall be completed prior to insulating and/or painting.

After the pipe is laid, the joints completed, and the trench partially backfilled leaving the joints exposed for examination, the newly laid piping or any valved section of piping shall, unless otherwise specified, be subjected for one hour to a pressure test. Well pump discharge pipes, force main and wastewater piping, shall be subjected for two hours to a hydrostatic pressure test of 150 psi. Each valve shall be opened and closed several times during the test. Exposed pipe, joints, fittings, and valves shall be carefully examined during the open-trench test. Joints showing visible leakage shall be replaced or remade as necessary. Leaking rubber gasketed joints shall be remade, using new gaskets if necessary. Cracked or defective pipe, mechanical joints, fittings, or valves discovered in consequence of this pressure test shall be removed immediately and replaced with sound material, and the test shall be repeated until the test results are satisfactory.

A leakage test shall be conducted after the pressure test has been satisfactorily completed. The duration of each leakage test shall be at least two hours, and during the test the pipe shall be subjected to 100 psi pressure. Leakage is defined as the quantity of water to be supplied into the newly laid pipe, or any valved section thereof necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled, and shall be less than:

$$L = 0.00054 \cdot N \cdot D \cdot P$$

where L = Allowable leakage, GPH  
N = Number of joints in test  
D = Nominal diameter in inches  
P = Average test pressure, PSIG

The Contractor shall notify the Engineer 24 hrs in advance of any test to be made. Such test shall be made only in the presence of the Engineer. Except where concrete reaction backing necessitates a five day delay, pipelines jointed with rubber gaskets, mechanical or bolted joints, or couplings may be subjected to pressure, inspected, and tested for leakage at any time after partial completion of backfill.

## 2.0 PIPE HANGERS AND SUPPORTS

### 2.1 Description

Contractor shall furnish all labor, materials, equipment, and incidentals to install pipe hangers and supports, including all metallic hanging and supporting devices and concrete inserts for supporting exposed piping.

Hangers and supports shall include all hanging and supporting devices of metallic and concrete construction shown on the Drawings, specified herein, or required for pipe, valves, apparatus, and equipment. Included in this classification are saddle stands, steel stanchions, hangers, pipe pole supports, supports made of structural steel, and all necessary pipe saddles, bearing plates, fastenings, drill anchors, anchors, and appurtenances.

No piping within the building is to be supported by the building frame. The piping shall be supported by a floor supported system approved by the Engineer.

In general, the recommended support spacing for PVC pipe is 6.0 ft:

### 2.2 Materials

Hangers and supports shall conform to the requirements of the following standards:

Structural Steel Shapes	-	ASTM A36
Structural Steel Plates	-	ASTM A283
Steel Pipe	-	ASTM A53, (Schedule 40)
Bolting Materials	-	ASTM A307

### 2.3 General

Hangers and supports shall be adequate to support the pipe, apparatus, and equipment in proper position and alignment and to prevent sway under all operating conditions. Hangers and supports shall be of standard design where possible and be best suited for the service required.

Except as otherwise approved, all hangers shall be capable of screw adjustments after erection of the pipe. All bolting materials for pipe hangers shall be aluminized. Hangers shall be made to fit the outside diameter of the pipe on which they are to be used. Sufficient hangers and supports shall be installed to provide a working safety factor of not less than five for each hanger based on the ultimate tensile strength.

Pipe shall be hung by means of adjustable swivel pipe ring type hangers.

Pipe supported from underneath and not subject to expansion shall have adjustable pipe saddle supports on properly sized pipe stanchions and ample properly grouted floor flanges.

Supports from the floor shall be grouted with non-shrink grout

## **2.4 Installation**

All piping shall be supported by approved hangers, inserts, or supports, with adequate provisions for expansion and contraction. No piping shall be supported from other piping.

All vertical pipes shall be supported at each floor, and at all points necessary to ensure rigid construction.

Each section of pipeline shall be laid out and all connections made while the pipe is held by temporary supports. After completion of connections, the pipe shall be clamped in position.

## **2.5 Anchors**

Anchors shall be furnished and installed where required for holding the pipe and equipment in position or alignment.

## **2.6 Painting**

All metal pipe supports shall be painted as directed by the Engineer.

## **2.7 Manufacturers**

Pipe hangers and supports shall be as manufactured by Grinnell, Pipe Shields Inc., Power Piping or an approved equal.

## **3.0 VALVES**

### **3.1 General**

Valves specified herein shall have the type of ends specified or as required by equipment connections.

Check valves shall be so protected by ball valves that they may be repaired without removal from the line.

All valves shall be of the sizes shown on the Contract plans and as far as possible all valves of the same type shall be from one manufacturer.

All valves shall have the name of the manufacturer and the working water pressure for which they are designed in raised letters upon some appropriate part of the body.

Polyvinyl chloride (PVC) shall be 12454-B cell classification conforming to ASTM D-1784.

### **3.2 Check Valves**

All PVC check valves shall be "true check" ball check valves. Valves shall ensure a positive seal that prevents reverse flow with extremely low back pressure. Valves shall be equally effective for horizontal or vertical installations. True union end connectors shall allow for easy removal from the line for inspection or service without taking apart the line. Valves shall be of all thermoplastic PVC construction with flanged end connections, Viton O-ring seals and shall be designed for 150 psi operating pressure. True check ball check valves shall be as manufactured by Hayward, NIBCO/Chemtrol, GF, and Plastic Systems or an approved equal.

### **3.2 Ball Valves**

All PVC ball valves shall be "safe block" true union ball valves permitting in-line maintenance and service without disconnecting pipe. Valves shall be of the full port design in all thermoplastic PVC construction with Viton O-ring seals and self-lubricating Teflon seats. Valves shall be designed for operation at 150 psi and shall have all flanged end connections. The true union ball valve shall be as manufactured by Hayward, NIBCO/Chemtrol, GF, and Plastic Systems or an approved equal.

### **3.4 Globe Valves (Throttling Valves)**

Globe valves shall be designed for use as both on-off and throttling service. The valve shall have a double lead stem thread for rapid open-close operation. Liquid shall not come in contact with the stem threads. The valve shall be of all thermoplastic PVC construction with flanged ends and shall provide for easy in-line maintenance without removing the valve from the line. The valve shall have Viton or EPDM stem seals with a sealing disc. The globe valves shall be as manufactured by M & T Plastics, Inc., Chemtrol, Inc., or an approved equal

### **3.5 Spare Parts**

The Contractor shall provide as spares, one each of the following valves for each size valve placed in the work: ball valves, check valves, and globe valves. He shall also provide two sets of seals, O-rings, etc. for each spare valve supplied.

### **3.6 Sample Tap Valves**

Contractor shall install sample taps as shown in the plans using a 1/4-inch size chemcock valve with hose x male threads. The chemcock valve shall be fabricated of PVC with vitron seals and rated for 150 psi at 75°F water. Shop Drawings for sample tap valves shall be approved by the Engineer.

[END OF SECTION]



## **ELECTRICAL WORK**

### **SECTION 16010**

#### **INDEX**

#### **1.0 SCOPE OF WORK**

#### **1.0 SCOPE OF WORK**

The contractor shall furnish and provide all labor, materials, equipment to perform all operations in connection with the installation of electrical systems, complete, in strict accordance with the specifications and the contract Drawings, and subject to the terms and conditions of the contract.

The principal items of work include, but are not necessarily limited to, the following:

Provide power and controls feeders from the well pumps to the pump control panel as shown and as specified.

Provide complete conduit and wiring system for power, lighting, controls, heating and general purpose receptacles for the treatment building as shown and as noted on the contract drawings.

Provide new distribution panelboard with main circuit breaker as shown and as specified.

Furnish and install new pump control panel as shown on the contract drawings and as specified herein.

Provide all required service, system and equipment grounding in accordance with Article 250 of the National Electric Code..

Provide all motor connections as shown on the contract drawings and as specified.

Furnish and install level control devices complete with necessary supports, cable, and termination's.

Provide all equipment, hardware, supplies, etc together with all labor, tools and supervision as required for a complete operating system as indicated and shown on the contract drawings.

Provide new electric service; 120/240V, 1Ø-3w, from existing New York State Gas & Electric(NYSG&E) utility pole #3 to the treatment building as shown. This shall include all applications, fees, permits, coordination and work required for a complete installation.

Install new utility metering equipment as shown. Metering equipment shall be furnished by NYSG&E.

In the event that it proves difficult or impossible to install outlets, panels or conduits in the locations shown on the contract drawings due to interference with structural or mechanical elements, the Contractor shall relocate such equipment as directed by the owner at no additional cost.

### **1.5 Test and Completion of Work**

All materials and the manner of installation shall be strictly in accordance with the requirements of the ordinances of the local and state board, the Code of the National Board of Fire Underwriters and must pass all inspections.

When any public authority, by-laws or ordinances requires any work to be tested or approved, the Contractor shall provide proper facilities for such test or inspection and bear all associated costs.

All tests shall be made before any circuit, main switch or line is energized. Circuits shall be phased out and connected to the panel or main switch in the proper manner. Loads shall be distributed as evenly as possible on all phases. All wires shall be entirely free from unintentional grounds and short circuits.

All circuits specified or ordered by the owner shall be tested by the Contractor and the resistance recorded. the Contractor shall submit recorded values to the Owner for approval before current is applied to any circuit.

The ground shall be tested and the resistance to the ground approved. All costs of testing shall be borne by the Contractor.

On completion of its work, the Contractor shall remove all temporary equipment and wiring. All temporary fuses and lamps used during construction shall be replaced with proper size fuses and lamps.

### **1.6 Intent of Contract Drawing Specifications**

It is the intent of the Contract Drawings and specifications to provide a complete workable system, tested, and ready for the Owner's operation. Any items not specifically shown on the Contract Drawings or called for in the specifications, but which are normally required to conform with the intent, are to be considered a part of the work to be done.

The locations of lighting fixtures, outlets, conduits, and other equipment indicated on the Contract Drawings are approximate and are understood to be subject to such revision as may be found necessary or desirable at the time the work is installed, in consequence of increase or reduction of the number of outlets, or in order to meet field conditions, or to coordinate with modular requirements of structures, or to simplify the work, or for other legitimate causes.

It shall be distinctly understood that the Contract Drawings show only the general run of conduits and approximate location of outlets.

Any significant changes in location of outlets, cabinets, etc., that the Contractor may find necessary in order to meet field conditions, shall be brought to the immediate attention of the Owner and shall receive approval before such alterations are made.

Circuit "tags" in the form of arrows shall be used to indicate the home runs of conduit to electrical distribution panels and switchboards. These tags show the circuits in each home run, the number of each circuit, and the panel designation. It is not intended that these numbers be followed in connecting the circuits at the panelboards. The Contractor shall show the actual circuits at the panelboards. The Contractor shall show the actual circuit numbers on the finished as built drawings.

#### **1.7 Familiarization with Project**

The Contractor shall thoroughly familiarize itself with the extent and nature of the work, not only as shown on the Contract Drawings and specifications of this Contract, but also with other possible Contracts.

#### **1.8 Definitions**

"Wiring" shall mean and include conduit, fittings, straps, supports, wire, connectors, tape, junction and outlet boxes, switches, cutouts, receptacles, splices, and all other items necessary and/or required in connection with such wiring.

[END OF SECTION]

## CONDUIT SYSTEMS

### SECTION 16110

#### INDEX

- 1.0 SCOPE OF WORK
- 2.0 RIGID NON-METALLIC CONDUIT
- 3.0 EXECUTION

#### 1.0 SCOPE OF WORK

The Contractor shall provide all labor, materials and equipment necessary to completely install the raceway systems as shown on the Contract Drawings and as specified in this section.

All raceways of a given type shall be the product of one manufacturer.

##### 1.1 Submittals

The contractor shall submit complete manufacturers data for all of the materials to be supplied in this section.

#### 2.0 RIGID NON-METALLIC CONDUIT

All conduit installed below grade and outdoors shall be rigid non-metallic, extra heavy wall, schedule 80 PVC. Conduit shall be "Plus 80" as manufactured by Carlon or approved equal.

All conduit installed indoors shall be rigid non-metallic, heavy wall, schedule 40 PVC. Conduit shall be "Plus 40" as manufactured by Carlon or approved equal.

##### 2.1 Flexible Conduit, Couplings and Fittings

Liquidtight, flexible metal conduit shall be Sealtite, Type UA, as manufactured by the American Brass Co. or an approved equal.

Fittings used with liquidtight flexible conduit shall be watertight as manufactured by the Thomas and Betts Co., Appleton Electrical, Triangle Conduit and Cable or an approved equal.

##### 2.2 Boxes and Fittings

All boxes and fittings shall be PVC with gaskets covers and corrosion-proof screws as manufactured by the Carlon or an approved equal.

### 2.3 Conduit Mounting Equipment

Hangers, rods, back-plates, beam clamps, etc., shall be fiberglass reinforced polyester. Mounting equipment shall be as manufactured by Aickinstrut or an approved equal.

### 3.0 EXECUTION

All conduit runs shall be rigid non-metallic PVC as specified and as shown on the Contract Drawings unless otherwise noted.

No conduit smaller than 3/4 in. electrical trade size shall be used, on runs above grade or 1 in on buried runs, nor shall any have more than three 90 degree bends in any one run. Pull boxes shall be provided as required or directed by the owner.

No wire shall be pulled until a conduit run is complete in all details.

The ends of all conduits shall be tightly plugged to exclude dust and moisture while the work is under construction.

Conduit supports shall be spaced at intervals of eight feet or less, as required to obtain rigid construction.

Single conduits shall be supported by means of one-hole pipe clamps in combination with one-screw back plates, to raise conduits from the surface. Multiple runs of conduits shall be supported on trapeze type hangers with steel horizontal members and threaded hanger rods. The rods shall not be less than 3/8 in. diameter.

All conduits on exposed work shall be run at right angles to and parallel with the surrounding wall and shall conform to the form of the ceiling. No diagonal runs will be allowed. Bends in parallel conduit runs shall be concentric. All conduit shall be run perfectly straight and true.

Conduit terminating in indoor steel cabinets shall have double locknuts and insulated bushings.

All conduit terminating outdoors or those that terminate indoors or originate from below grade or outdoors shall be terminated with watertight sealing bushing.

Conduit wall seals shall be used for all conduits penetrating floors or walls below grade or other locations shown on the Contract Drawings.

Liquidtight flexible metal conduit shall be used for all motor termination's and other equipment where vibration is present.

All conduits entering the building or entering either an outdoor enclosure or below-grade enclosure shall be sealed.

Liquidtight flexible metal conduit may be used in short lengths (max. 3ft) where necessary.

Boxes shall be set square with adjacent ceiling, floor, wall or beam lines. Covers for boxes shall have a neoprene gasket. Conduits shall enter all boxes squarely. Covers shall be secured to boxes with stainless steel machine screws as required and no other boxes or covers shall be used except with the special permission of the Owner.

Pull boxes shall be of ample size to receive, without crowding, all conduits entering them. Boxes shall be accessible when in place. Boxes shall be sized in accordance with the National Electrical Code as a minimum size.

[END OF SECTION]

## **WIRES AND CABLE**

### **SECTION 16120**

#### **INDEX**

- 1.0 SCOPE OF WORK**
- 2.0 PRODUCTS**
- 3.0 EXECUTION**

#### **1.0 SCOPE OF WORK**

The Contractor shall Provide all wire and cable together with all materials and accessories required to make a complete operating wiring installation for the power and control systems all in accordance with first class material and workmanship, and in conformity with all applicable codes and regulations.

All wire and cable shall be new, shall have been manufactured within the past six months, and shall not have been stored in the weather.

##### **1.1 Submittals**

The contractor shall submit complete manufacturers data for all of the materials to be supplied in this section.

#### **2.0 PRODUCTS**

##### **2.1 Wire Size**

Conductors #12 and #10 shall be solid; wire and cable #8 and larger shall be stranded.

Wire sizes shall conform to the regulations of the National Electrical Code. Wire sizes indicated on the Contract Drawings represent the minimum size wire acceptable; the actual requirements of the circuit as installed or as required under the applicable code or ordinance shall determine the size of the conductor to be installed.

Minimum size # 12 shall be used for all power circuits. Minimum wire size #14 shall be used for all control units.

##### **2.2 Conductors**

Conductors before stranding shall meet the physical and electrical requirements of the latest edition of ANSI Specifications C7.1 for soft or annealed copper wire and ASTM Class B stranding designation.

Insulated cable, single conductor, for power and control shall be Underwriters' Laboratories labeled, Type XHHW. Insulation shall be color coded as specified herein. A six(6) inch section of colored tape may be substituted where power cables are used.

Service entrance cable used between the utility pole and the main service disconnect means shall be three(3) copper conductors with XLP insulation, type XHHW-2, 600 volts, 90°C, with bare copper ground conductor, overall PVC jacket, suitable for direct burial and sized as shown. Cable shall be Type TC as manufactured by Rome Cable Corp. or approved equal.

Cable used to extend the level sensing signal from the well vaults to the treatment building shall be #16, twisted, tinned, stranded copper conductors with spiral shield and PVC insulation, UL recognized. Cable shall be catalog #8720 as manufactured by Belden.

Bare cable for grounding (as allowed by N.E.C.) shall be furnished in compliance with the latest revision of ASTM Designation B-3 and B-80

All above wires shall be manufactured by Okonite, General Cable, American, Rome or an approved equal.

### 2.3 Color Coding

Power wiring shall maintain consistent phase identification of all wires from service feeders to branch circuit wires as follows:

Phase A	Black
Phase B	Red
Phase C	Blue
Neutral	White
Ground	Green (or bare)

Control and signal system wiring shall be consistently color coded to avoid confusion and to permit easy identification using the IPCEA color coding system wherever possible; no two wires in the same raceway shall be of the same color, unless they are part of a parallel circuit.

## 3.0 EXECUTION

### 1.1 General

Wires shall be pulled into raceways carefully so as not to damage insulation or strain conductors. Splices of wires smaller than #8 may be made with Ideal, King, or T&B insulated wire-nuts. Splices of wires #8 and larger shall be made with solderless connectors, and covered with tape to 150% of insulation level of the cable. Tape shall be "Scotch No. 88," or an approved equal. Connectors shall be covered with "Scotchfil" before taping. Splicing shall be done only by experienced splicers using new high quality approved materials.



Where wires are terminated on screw terminals, compression type fork tongue lugs, Burndy Hylug shall be used, or equivalent by Thomas and Betts Co., or other approved equal.

Where control, signal, alarm, and instrumentation wires are connected to terminals on blocks or equipment the conductors shall be identified with Brady (or other approved equal) markers. Terminal block positions shall be consistently identified; and the entire wiring system shall be consistently marked to correspond with vendors' and as-built drawings.

A lubricant may be used for pulling wires into conduit provided the lubricant is approved, and compatible with wire sheath and conduit material.

All wiring in the building, shall be in raceway.

[END OF SECTION]

## **GROUNDING SYSTEM**

### **SECTION 16450**

#### **INDEX**

- 1.0 GENERAL**
- 2.0 PRODUCTS**
- 3.0 EXECUTION**

#### **1.0 GENERAL**

The Contractor shall provide a complete grounding system in strict accordance with Article 250 of the National Electrical Code and as specified in this section and as shown on the Contract Drawings.

##### **1.1 Submittals**

The contractor shall submit complete manufacturers data for all of the materials to be supplied in this section.

#### **2.0 PRODUCTS**

##### **2.1 Material Specified in Other Sections**

Wire shall be as specified under Section 16120 Wires and Cables.

Conduit shall be as specified under Section 16110 Conduit systems.

##### **Materials**

Ground rods shall be 3/4" diameter, ten(10) feet long copper clad steel.

Ground cable splices shall be made with appropriate Burndy (or other approved equal) compression connectors. Ground connectors of cable to steel shall be approved Burndy types intended for such use, or equivalent by Thomas and Betts Co., or other approved equal.

#### **3.0 EXECUTION**

##### **3.1 Installation**

All electric power equipment shall be completely grounded including motor frames, generator, panels, metal enclosures, building and supporting structures, switch and circuit breaker frames, cabinets, contactors, and all other equipment expected to remain at ground potential.

Liquid tight flexible metal conduit shall have bonding jumpers.

Exposed connections shall be made by means of approved grounding clamps. Exposed connections between different metals shall be sealed with No-Oxide paint Grade A or an approved equal.

The Contractor shall exercise care to ensure good ground continuity, in particular, between the conduit system and equipment frames and enclosures. Where necessary, jumper or bonding wires shall be installed. The Contractor shall make complete resistance tests of the entire grounding systems, using a megger ground tester or ground ohmer. All connections shall be tested for continuity. Additional ground connections shall be installed by the Contractor as required to achieve a maximum of five ohm ground resistance.

### 3.2 Testing

The Contractor shall test the ground resistance of the system. Dry season resistance of the system shall not exceed five ohms. If such resistance cannot be obtained with the system as shown, the Contractor shall provide additional grounding as directed by the Owner at no additional cost.

[END OF SECTION]

# **PANELBOARDS**

## **SECTION 16470**

### **INDEX**

- 1.0 SCOPE OF WORK
- 2.0 PRODUCTS
- 3.0 EXECUTION

#### **1.0 SCOPE OF WORK**

Contractor shall furnish and install a new electric distribution panelboard, together with all circuit breakers, hardware, labor, and equipment necessary for a complete operating system in strict accordance with this specification and the contract drawings.

##### **1.1 References**

The panelboard and circuit breakers referenced herein are designed and manufactured according to the latest revision of the following specifications.

NEMA PB 1 - Panelboards

NEMA PB 1.1 - Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less.

NEMA AB 1 - Molded Case Circuit Breaker and Molded Case Switch

UL 50 - Boxes and Cabinets

UL 67 - Panelboards

UL 489 - Molded Case Circuit Breakers and Circuit Breaker Enclosures

Federal Specification W-P-115B Type I Class 1

Federal Specification W-C-375B/GEN - Molded Case Circuit Breakers

NFPA 70 - National Electrical Code (NEC)

ASTM - American Society of Testing Materials

##### **1.3 Submittal And Record Documentation**

Approval documents shall include drawings. Drawings shall contain overall panel dimensions, interior mounting dimensions, and wiring gutter dimensions. The location of the main,

branches and solid neutral, shall be clearly shown. In addition, the drawing shall illustrate one line diagrams with applicable voltage systems.

#### **1.4 Qualifications**

Company specializing in manufacturing of panelboard products with a minimum of ten (10) years documented experience.

Panelboards shall be manufactured in accordance with standards listed in section 1.02.

#### **1.5 Delivery, Storage, And Handling**

Inspect and report concealed damage to carrier within their required time period.

Handle carefully to avoid damage to panelboard internal components, enclosure, and finish.

Store in a clean, dry environment. Maintain factory wrapping or provide an additional heavy canvas or heavy plastic cover to protect enclosure(s) from dirt, water, construction debris, and traffic.

#### **1.6 Warranty**

Manufacturer shall warrant specified equipment free from defects in materials and workmanship for the lesser of one (1) year from the date of installation or eighteen (18) months from the date of purchase.

### **2.0 PRODUCTS**

#### **2.1 Manufacturers**

Panelboards shall be as manufactured by Square D Company ,GE ,Westinghouse, Siemens or a approved equal.

#### **2.2 Lighting And Appliance Panelboards**

Shall be rated for 120/240 V AC, 1Ø-3W. Continuous main current ratings as indicated on associated schedules, not to exceed 600 amperes maximum. Minimum Short Circuit Current Rating: 45,000 or as indicated in RMS symmetrical amperes at 240 volts AC.

#### **2.3 Interior**

Provide one (1) continuous bus bar per phase. Each bus bar shall have sequentially phased branch circuit connectors suitable for plug-on or bolt-on branch circuit breakers. The bussing shall be fully rated. Panelboard bus current ratings shall be determined by heat-rise tests conducted in accordance with UL 67. Bussing rated 100 - 400 amperes shall be Copper.

Panelboards shall be suitable for use as Service Equipment when application requirements comply with UL 67 and NEC Articles 230-F and G.

All current carrying parts shall be insulated from ground and phase-to-phase by Noryl high dielectric strength thermoplastic or equivalent.

Split solid neutral shall be plated and located in the mains compartment up to 225 amperes so all incoming neutral cable may be of the same length.

Interior trim shall be of dead-front construction to shield user from energized parts. Dead-front trim shall have pre-formed twistouts covering unused mounting space.

Metal nameplates shall be secured to dead-front with rivets or screws. Sticker or foil nameplates are not permitted. Interior wiring diagram, neutral wiring diagram, UL listed label and short circuit current rating shall be displayed on the interior.

Interiors shall be field convertible for top or bottom incoming feed. Main and sub-feed circuit breakers shall be vertically mounted. Main lug interiors up to 400 amperes shall be field convertible to main breaker. Interior leveling provisions shall be provided for flush mounted applications.

#### **2.4 Main Circuit Breaker**

Molded case circuit breakers shall have an overcenter, trip-free, toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have a permanent trip unit with thermal and magnetic trip elements in each pole. Each thermal element shall be factory calibrated to operate in a 40°C ambient environment. Thermal elements shall be ambient compensating above 40°C.

Two and three pole circuit breakers shall have an internal common trip crossbar to provide simultaneous tripping. Circuit breakers frame sizes above 100 amperes shall have a single magnetic trip adjustment located on the front of the breaker which allows the user to simultaneously select the desired trip level of all poles. Circuit breakers shall have a push-to-trip button for maintenance and testing purposes.

Breaker handle and faceplate shall indicate rated ampacity. Standard construction circuit breakers shall be UL listed for reverse connection without restrictive line or load markings.

Circuit breaker escutcheon shall have International I/O markings, in addition to standard ON/OFF markings. Circuit breaker handle accessories shall provide provisions for locking handle in the "ON" or "OFF" position.

Lugs shall be UL listed to accept solid or stranded copper conductors only. Lugs shall be suitable for 90°C rated wire, sized according to the 75°C temperature rating per NEC Table 310-16. Lug body shall be bolted in place, snap-in designs are not acceptable.

## 2.5 Branch Circuit Breakers

Breakers shall be UL listed with amperage ratings, interrupting ratings, and number of poles as indicated on the panel schedules.

Molded case branch circuit breakers shall have Bolt-on bus connectors. Circuit breakers shall have an overcenter toggle mechanism which will provide quick-make, quick-break contact action. Circuit breakers shall have thermal and magnetic trip elements in each pole. Two and three pole circuit breakers shall have an internal common trip crossbar to provide simultaneous tripping.

The exposed faceplates of all branch circuit breakers shall be flush with one another.

Lugs shall be UL listed to accept solid or stranded [copper and aluminum conductors], [copper conductors only]. Lugs shall be suitable for 90°C rated wire, sized according to the 75°C temperature rating per NEC Table 310-16.

## 2.6 Enclosures

### Type 1 Trim Fronts

Trim front steel shall meet strength and rigidity requirements per UL 50 standards. Shall have ANSI 49 gray enamel electrodeposited over cleaned phosphatized steel.

Trim fronts shall be [1-piece with door], [hinged 1-piece with door]. Mounting shall be [flush], [surface] or as indicated on associated [schedules], [drawings].

Panelboards rated 225 amperes and below shall have MONO- FLAT fronts with concealed door hinges and trim screws. Front is not removable with the door locked. Panelboards rated above 225 amperes shall have fronts with trim clamps and concealed door hinges. Trim front doors shall have rounded corners and edges shall be free of burrs.

Front shall have cylindrical tumbler type lock with catch and spring loaded stainless steel door pull. All lock assemblies shall be keyed alike. Two (2) keys shall be provided with each lock. A clear plastic directory card holder shall be mounted on the inside of door.

## 3.0 EXECUTION

### 3.1 Installation

Install panelboards in accordance with manufacturer's written instructions, NEMA PB 1.1 and NEC standards.

- Anchor panelboards to structure and make branch circuit connections.

Coordinate the panelboard bus ratings and circuit breaker coordination rating with the available fault current.

Provide engraved laminated nameplates under the provisions of Section 16195.

### **3.1 Field Quality Control**

Inspect complete installation for physical damage, proper alignment, anchorage, and grounding.

Measure steady state load currents at each panelboard feeder; rearrange circuits in the panelboard to balance the phase loads within 20% of each other. Maintain proper phasing for multi-wire branch circuits

Check tightness of bolted connections, and circuit breaker connections using calibrated torque wrench or torque screwdriver per manufacturer's written specifications.

[END OF SECTION]



# SYSTEM CONTROL PANEL

## SECTION 16500

### INDEX

- 1.0 GENERAL
- 2.0 PRODUCTS
- 3.0 EXECUTION

### 1.0 GENERAL

The contractor shall provide all labor, materials and equipment required to install, fabricate, assemble, wire, deliver, calibrate, test and otherwise put into complete operation the Pump Control Panel for the control and operation of the two ground water pumps 1S and 2D. Each pumps controls shall originate from submersible level transducers located in each well.

The control Panel shall include, but not be necessarily be limited to the following items:

- NEMA rated magnetic motor starters.
- Motor circuit protector type circuit breakers and fuses.
- Indicating lights.
- Control, timing and power relays.
- Push-buttons and selector switches.
- Flashing beacon.
- Microprocessor based controllers and annunciators

#### 1.1 Description of Operation

The pump control panel shall provide independent operation and alarm for each of the ground water pumps via submersible level transducers located in each well and a microprocessor based level controller for each pump. An H-O-A selector switch shall be provided for automatic and manual selectability. In automatic mode the pumps shall start and stop via a signal from the level transducer, as the water in the wells rises to a preset level above the pump. The pump shall be shut off when the level transducer senses a preset water level below the start level. Each pump shall have high and low level alarm points, above and below the respective start and stop points. All pump starts shall have a 0-30s adjustable time delay to prevent pump cycling. Operation in manual mode shall be provided by switching the H-O-A switch to the Hand position, all alarms shall be defeated when operating in this mode.. Hand position shall be equipped with a spring return to off. Each well shall have a continuous level indication on the face of the panel as well as pump run indication and run time meters.

Control panel shall include alarm annunciation and pumping system shutdown when inlet pressure to the first filter chamber reaches a preset valve. All other alarms shall be annunciated without causing a pumping system shutdown. Common alarm shall be annunciated via a flushing beacon mounted on the exterior building wall.

## 1.2 Submittals

The contractor shall submit shop drawings for the pump control panel showing the interconnecting wiring, panel layout and items to be installed. The submittal shall include manufacturers data on all items.

## 2.0 PRODUCTS

### 2.1 Enclosure

Control Panel enclosure shall be, NEMA 12, neoprene gasketed, with inner panel, 14 gauge steel, double door clamps, continuous hinge and polyester power paint finished over phosphatized surfaces. Enclosure shall be sized as required and manufactured by Hoffman or Hammond or approved equal.

### 2.2 Microprocessor Based Controller

Pump controls shall include a microprocessor based liquid level controller. Controller shall be mounted in the door of the enclosure. Functions not provided from the controller shall be implemented via standard relay logic. Pump controller shall be capable of providing automatic control of a single pump via level sensing pressure transducers. Controller shall accept 4-20mA input signal from a submersible level transducer and have the following features; four(4) adjustable set points with Form C, 2A relay outputs; 24V DC power loop; 120 V AC; 60Hz; UL listed and .56" high, red digital indicating display Controller shall be furnished with surge suppressers supplied by the same manufacturer as the controller. Liquid level controller shall Model PD690-3-17 as manufactured by Precision Digital Corporation or approved equal. Surge suppressers shall be Model PDX-690-1 by Precision Digital Inc. Or approved equal.

### 2.3 Control and Alarm Relays

Control and alarm relays shall be plug-in type, with separate base, transparent cover, 120V AC coil, 3 SPDT 10A contacts, UL recognized, 'KU' series as manufactured by Potter-Brumfield.

### 2.4 Four(4) Point Annunciator

Annunciation of low level and high level alarms for each well shall be provided via a four(4) point annunciator. Annunciator shall have four (4) relay inputs, NO or NC; red alarm indicating LED's; green power LED; 120VAC; 60Hz; acknowledge switch; UL pending and alarm horn. Alarm horn shall not be used, common alarm output shall be wired to a flashing beacon on the outside of the building. Annunciator shall be Model PD141AFO as manufactured by Precision Digital Inc.

### 2.5 Time Delay Relays

Time delay relays shall be plug-in, adjustable type with delay action as require, 120V AC coil, DPDT 10A contacts, UL listed. Time delay shall be adjustable via dip switches on the face of

the relay, delay shall be adjustable from 1 to 1023 seconds. relay shall be 'TD' series as manufactured by SSAC or approved equal.

## **2.6 Combination Magnetic Motor Starters**

Magnetic motor starters shall be full voltage non-revering combination type with motor circuit protector(MCP) type circuit breakers, UL listed, three pole 60 Hz, 120V AC coil two(2) sets of NO two(2) sets of NC contacts, and three pole bimetallic thermal overload relay. Starter shall be Class 8536 as manufactured by Square D or approved equal, MCP circuit breaker shall be Mag Gard as manufactured by Square D or approved equal.

## **2.7 Indicating Lights**

Indicating lights shall be heavy duty oil-tight, 30.5 mm, NEMA 4X, push-to-test type, 120V AC to 6V transformer, UL List and colored lens as specified. As manufactured by Cutler-Hammer, GE or SquareD.

## **2.8 Push-button and Selector Swiches**

Push-button and selector switches shall be heavy duty oil-tight, NEMA 4X, UL List,30.5 mm, as manufactured by Cutler-Hammer, GE or Square D.

## **2.9 Wiring**

All wiring for control and alarm circuits shall be #14 AWG min.

## **2.10 Submersible Level Transducer**

Level sensing probes shall be submersible, electrically isolated, precision gauge pressure sensing transducer type, 1 3/8" stainless steel housing, 7/8" Viton or Teflon faced bottom diaphragm, 4-20mA signal output, sealed breather system, integral transient protection and solid state electronics. Unit shall come complete with cable suspension mounting kit consisting of: 2' long; 316 stainless steel pipe; couplings; bolts and cable clamps. Unit shall be installed with the sealed breather bag in a NEMA 4 enclosure within the pump vault. Breather tube shall be terminated at the breather bag with the signal conductors spliced and extended to the Pump Control Panel. External electronics components shall be mounted in pump control panel. No electrical items, except termination shall be placed in below grade junction boxes. Transducer shall come complete with all external electronics and hardware necesarry for a complete operating system. Transducer and all accessories shall be by the Consolidated Electric Company, transducer shall be A1200 Specification or approved equal.

## **2.11 PRESSURE SWITCH**

Pressure switch shall be brass bourdon tube type with SPDT, 4A, 120V AC mercury switch, adjustable deadband, adjustable operating range (1-35 psig), general purpose enclosure and U.L. Listed. Pressure switch shall be model number DA-31-153-4 as manufactured by Mercoird or approved equal.

## 2.12 FLASHING BEACON

Flashing beacon shall have 100W, 120V AC rotating sealed beam, U.L. Listed for outdoor use, red Lexan dome, diecast aluminum housing with ribbed cooling fans and suitable for surface mounting. Beacon shall be Model 3716 as manufactured by Federal Signal.

## 3.0 EXECUTION

The panel shall be completely factory assembled, wired, and tested by a manufacturer regularly engaged in producing such equipment. Approved manufacturer shall have no less than five(5) years experience in the fabrication of control panel for the water and wastewater industry. The completed pump control panel shall bare the Underwriter Label.

All wiring and terminal blocks within the panel shall be numbered and clearly marked at both ends with an approved vinyl coated cloth tape. Approved marking tape shall be by 3M, Thomas & Betts, Ideal or approved equal.

All wiring entering or leaving panel shall be terminate on terminal blocks. Wiring on screw terminal shall have crimp type insulated spade lugs by Burndy or T&B.

The following items of equipment shall be furnished and installed on the inner panel:

- All required control and alarm relays.
- Control transformer(s) as required.
- Fuses.
- Magnetic motor starters and circuit breakers.

The face of the panel shall contain the following:

- Liquid level controller.
- Annunciator panel(s).
- Indicating lights
- Run Time Meters
- Reset Pushbutton

The following condition shall be annunciated via annunciator panels on the face of the control panel:

- Pump 1S Run
- Pump 2D Run
- Power On
- Pump 1S Low Level Alarm
- Pump 1S High Level Alarm
- Pump 2D Low Level Alarm
- Pump 2D High Level Alarm
- Filter High Pressure Alarm

Each alarm light shall remain energized until manually reset.

Provide engraved laminated nameplates on the face of the enclosure the unit and each pilot device function. Letters shall be black on white background, 3/8 inch high.

All terminal boards and wire and cable terminals shall be identified with engraved markings by their respective wire designation numbers.

All wiring shall be neat and sturdy, with all wires grouped as much as possible. Wiring shall be installed so that there shall not be any cuts or kinks in the wires and cables. All internal wiring shall be firmly supported and clamped to prevent undue stress on the conductor terminals and to eliminate loosening or shifting in conductor position.

All alarms shall be wired to provide a common alarm output to a flashing beacon mounted on exterior building wall.

Prior to panel fabrication, the contractor shall submit to the engineer for approval shop drawings showing the interconnect wiring, panel layout and equipment to be installed in the fabrication of the control panel.

Contractor shall provide control transformers as required with appropriate fusing as per the NEC.

Provide a nameplate for the panel and for each function, each device, each indicating light, and each position of switches and circuit breakers. Nameplates shall be engraved, laminated plastic, black letters on white background. Letters shall be upper case, ¼ inch minimum height.

[END OF SECTION]

**APPENDIX A**  
**COMMUNITY AIR MONITORING PLAN**

## Community Air Monitoring Plan

Real-time air monitoring, for volatile compounds and particulate levels at the perimeter of the work area is necessary. The plan must include the following:

- Volatile organic compounds must be monitored at the downwind perimeter of the work area on a continuous basis. If total organic vapor levels exceed 5 ppm above background, work activities must be halted and monitoring continued under the provisions of a Vapor Emission Response Plan. All readings must be recorded and be available for State (DEC & DOH) personnel to review.
- Particulates should be continuously monitored upwind, downwind and within the work area at temporary particulate monitoring stations. If the downwind particulate level is  $150 \mu\text{g}/\text{m}^3$  greater than the upwind particulate level, then dust suppression techniques must be employed. All readings must be recorded and be available for State (DEC & DOH) personnel to review.

### Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the perimeter of the work area, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the perimeter of the work area, activities can resume provided:

- the organic vapor level 200 ft. downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background.

If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown. When work shutdown occurs, downwind air monitoring as directed by the Safety Officer will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in the Major Vapor Emission section.

## Community Air Monitoring Plan

### Major Vapor Emission

If any organic levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of the work activities, or as the result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality must be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20 Foot Zone).

If efforts to abate the emission source are unsuccessful and if the following levels persist for more than 30 minutes in the 20 Foot Zone, then the Major Vapor Emission Response Plan shall automatically be placed into effect;

- if organic vapor levels are approaching 5 ppm above background.

However, the Major Vapor Emission Response Plan shall be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

### Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

1. All Emergency Response Contacts as listed in the Health and Safety Plan of the Work Plan will go into effect.
2. The local police authorities will immediately be contacted by the Safety Officer and advised of the situation.
3. Frequent air monitoring will be conducted at 30 minutes intervals within the 20 Foot Zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the Safety Officer.

92275PRO0524



**APPENDIX B**

**GEOLOGIC LOGS OF TEST BORINGS**

Project       BIGV/BPM       Date 4-14-93

Location       Baldwin Place, New York      

Boring/Well Designation       MW-5D      

Land Surface Elevation        Estimated 602.80 Surveyed

Drilling Method       Air Hammer      

Drilling Fluid       Air      

Sampling Method       Split Spoon 2ft. long/Grab      

Sampling Interval       Continuous to Water then 5 Foot Interval      

Drilling Contractor       Samuel Stothoff      

Prepared By: V. Uhl and K. McKeever

From (ft)	To (ft)	Sample Recovery	Sample Description
0	3.0	Grab	Asphalt; SILT with with some very fine sand, brown-green, with gravel, HNU=0 ppm.
3.0	5.0	1 ft.	SAND, fine to medium, sub-angular to rounded; with some silt, brown-green, moist, and gravel, HNU=0 ppm.
5	10	Grab	SAND, fine to medium, sub-angular to rounded; with some silt, brown-green, and gravel.
10	12	1.5 ft.	Top of spoon: SAND, fine to medium, sub-angular, HNU=0 ppm. Bottom of spoon: SILT, grey-green.
12	15	Grab	SILT; and sand, medium to coarse, green-grey, and gravel, with trace weathered remnants of gneiss.
15	17	1.8 ft.	SILT; with some fine sand, green/grey, trace clay, with fine gravel, HNU=0 ppm.
17	20	Grab	Silty CLAY with little fine sand, brown-green.

Boring/Well Designation MW-5D  
 Geologic/Drilling Activity Log

From (ft)	To (ft)	Sample Recovery	Sample Description
20	22	1.5 ft.	SILT with some very fine sand, green, some quartz, and trace angular gravel, HNU=0 ppm..
22	23	Grab	Dry drilling.
23	25	2.0 ft.	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green, HNU=0 ppm.
25	30	Grab	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green, dry drilling.
30	32	0.5 ft.	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green, wet, HNU=0 ppm.
32	35	Grab	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green, moist.
35	37	1.5 ft.	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green, HNU=0 ppm.
37	40	Grab	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green.
40	42	1.0 ft.	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green.
43	45	Grab	SILT; with some very fine to medium sand, and angular to sub-rounded gravel, green, moist.
45	47	1.0 ft.	SILT; with some very fine sand, and angular to sub-rounded gravel, green, HNU=0 ppm.

From (ft)	To (ft)	Sample Recovery	Sample Description
47	50	Grab	SILT; with some very fine sand, and angular to sub-rounded gravel, green, moist/caking.
50	52	1.0 ft.	SILT; with some very fine sand, and angular to sub-rounded gravel, green, moist, HNU=0 ppm.
52	55	Grab	SILT; with some very fine sand, and angular to sub-rounded gravel, green.
55	57	1.5 ft.	Top 1 ft. of spoon: SILT; with a little coarse sand and trace clay, green. Bottom 0.5 ft. of spoon: GNEISS; weathered and angular, with some silt and some tan & black mica, HNU=1.0 ppm.
57	60	Grab	SILT; green, with weathered gneiss fragments.
60	62	0.2 ft.	GNEISS; weathered to a medium sand, white quartz, black mica, spoon drove very hard, HNU=0 ppm.
	4/15/93		
62	65	Grab	Weathered GNEISS; large angular to sub-angular fragments, of white quartz, black mica, and pink feldspars, HNU=0 ppm.
65	67	0.2 ft.	Weathered GNEISS; angular to sub-angular fragments, of white quartz, black mica, and pink feldspars, spoon drove very hard, HNU=0 ppm.
65	70	Grab	GNEISS; angular to sub-angular fragments, of white quartz, black mica, and pink feldspars, very little flow.
70	75	Grab	GNEISS; angular to sub-angular fragments, of white quartz, black mica, and pink feldspars, very little flow.



Project \_\_\_\_\_BIGV/BPM\_\_\_\_\_ Date \_\_11/15/93\_\_

Location \_\_\_\_\_Baldwin Place Mall\_\_\_\_\_

Boring/Well Designation \_\_\_\_\_TB-16/MW-11D\_\_\_\_\_

Land Surface Elevation \_\_\_\_\_Estimated \_\_\_\_\_Surveyed

Drilling Method \_\_\_Wet Rotary\_\_\_\_\_

Drilling Fluid \_\_\_\_\_Water from BPM Supply\_\_\_\_\_

Sampling Method \_\_\_Split Spoon 2ft. long/Grab\_\_\_\_\_

Sampling Interval \_\_\_Continuous\_\_\_\_\_

Drilling Contractor \_\_\_Samuel Stothoff\_\_\_\_\_

From (ft)	To (ft)	Sample Recovery (ft)	Time/Hydraulic Pressure or Blow Counts per 6-inch interval	Sample Description
0	2	1		Sand, silt little clay, brown. Some rounded gravel, no odors, moist at tip of spoon.
2	4	1		Silty sand and clay, brown, wet, slight chemical odor.
4	6	1.8		From 4 ft.-4.5 ft.: Silty sand and clay, brown, moist, HNU=300ppm. From 4.5 ft.-5 ft.: Silty lense, approx. 0.5 ft. thick, HNU=100ppm. From 5 ft.-6 ft.: Silty sand and clay, with fine to medium gravel, rounded to subangular.
6	8	1.6		Silty sand and clay (till) with fine, rounded to subrounded gravel. Strong chemical odor.

Boring/Well Designation TB-16/MW-11D  
 Geologic/Drilling Activity Log

From (ft)	To (ft)	Sample Recovery (ft)	Time/Hydraulic Pressure or Blow Counts per 6-inch interval	Sample Description
6	8	1.6	Continued	Average HNU=250 ppm and 5 ppm at the tip of the spoon.
8	10	2		Silty sand and and clay (till), gravel layer coarse at approx. 9 ft., sample saturated (possibly water form gravel), HNU=10-15 ppm.
10	12	2		From 10 ft.-10.7 ft.: Silty sand, saturated. From 10.7 ft.-12 ft.: Silty sand and clay (till) with fine rounded to subrounded gravel(till hard with more silt and less clay).
12	13	1.5	34/100 for 4"	Upper 1 ft. of spoon: Silty sand, below 1 ft. lense of weathered granitic material. From 13 ft.-14 ft.: Silty sand and clay (till) with rounded to subrounded gravel. No odors, HNU=0. Note: Upper 0.5 ft. may be fall in form above, augered to 14 feet.
14	15	1	8/34	Silty clay, moist at 14-15ft., silty sand at tip of spoon (15 ft.), HNU=0, no odors.
15		Grab		Attempted Shelby Tube, no penetration, tube bent. Drilling out additional 1 foot to attempt another. Sand, fine to medium, trace coarse sand, some silt.

Boring/Well Designation TB-16/MW-11D  
 Geologic/Drilling Activity Log

From (ft)	To (ft)	Sample Recovery (ft)	Time/Hydraulic Pressure or Blow Counts per 6-inch interval	Sample Description
16	18	1.2	55-73-100/2	From 16 ft.-17.2 ft.: Till, silt, trace clay, trace sand, very fine to fine, trace gravel, fine to coarse, subrounded to subangular, green-brown, moist to wet, very dense.
18	20	0.9	67-100/3	Till, silt, trace clay, trace sand, very fine to fine, trace gravel, fine to medium, subrounded to subangular, green-brown, moist to wet, very dense.
20	22	1.0	44-100-100/2	Till, silty sand, fine, trace clay, trace gravel, fine to medium, subrounded to subangular, green-brown, moist, very dense.
22	24	0.75	92-100/1.75	Till, silty sand, very fine, trace clay, trace gravel, fine to medium, subrounded to subangular, green-brown, moist, very dense.
24	26	0.9	54-100/5	Till, silt, trace clay, trace gravel, fine to medium, subrounded to subangular, green-brown, moist, very dense.
26	28	0.7	75-100/2	Till, silt, little gravel, fine to coarse, trace sand, medium to coarse, trace clay, green-brown, moist, very dense.
28	30	0.7	65-100/2	Till, silt, little gravel, fine to medium, trace sand, medium to coarse, trace clay, green-brown, moist, very dense.



