FOR INFORMATIONAL USE ONLY - DO NOT USE TO PREPARE YOUR BID

TO BE COMPLETED BY CONTRACTORS SUBMITTING A BID ON
S3C067-13G

ITEM NO.	APPROX. QUANTITIES	ITEMS BID WITH AMOUNT BID WRITTEN IN WORDS				
1	Lump Sum	Remove and dispose of existing protected tank and piping.	N/A	N/A		
2	Lump Sum	Provide new protected tank, piping, appurtenances, electrical and restoration.	N/A	N/A		
3	Allowance	For furnishing all labor, materials, equipment and incidentals for unforeseen conditions and associated additional work. Fifty Thousand DOLLARS No CENTS	N/A	N/A	$50,000	00

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ALLOWANCES

It is expressly understood and agreed that the total Bid presented in this Proposal is the basis for establishing the amount of the Bid Security and includes the following allowances:

- Item No. 3: An allowance of fifty thousand dollars ($50,000.00) for unforeseen conditions, as specified in Section 01210 – Allowances.

All in accordance with the requirements of Division 1, Special Conditions; Section 01010, Summary of Work; Section 01210, Allowances; and Section 01500, Temporary Facilities and Controls.

Final Contract Payment for allowance items shall be based upon actual payments, and not on the approximate amounts cited herein.

DETERMINATION OF LOW BID

Determination of low Bid will be made by comparing the Total Base Bid which shall include the lump sum Bid prices and allowances.

MAJOR EQUIPMENT ITEMS

The Bidder shall fill the name and address of the one proposed manufacturer for each major equipment item tabulated hereinafter. It is expressly understood that the furnishing of this information will not relieve the Bidder of any requirements of the Contract Documents and failure to fill out properly is grounds for rejection.

Specification Number	Description	Manufacturer
316333	Drilled Micropiles	
331638	Ground-Level Glass Coated to Bolted Steel Water Storage Tank	

NASSAU COUNTY DEPARTMENT OF PUBLIC WORKS
DIVISION OF SANITATION AND WATER SUPPLY
MISCELLANEOUS IMPROVEMENTS AT THE
CEDAR CREEK WATER POLLUTION CONTROL PLANT
CONTRACT NO. S3C067-14G GENERAL CONSTRUCTION

TECHNICAL SPECIFICATIONS INDEX

GENERAL REQUIREMENTS SUBGROUP

DIVISION 01 - GENERAL REQUIREMENTS

FACILITY CONSTRUCTION SUBGROUP

DIVISION 02 - EXISTING CONDITIONS

DIVISION 03 - CONCRETE

DIVISION 04 - MASONRY

NO ITEMS THIS DIVISION

DIVISION 05 - METALS

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

NO ITEMS THIS DIVISION

DIVISION 07 -THERMAL AND MOISTURE PROTECTION

NO ITEMS THIS DIVISION

DIVISION 08 - OPENINGS

NO ITEMS THIS DIVISION

DIVISION 09 – FINISHES

NO ITEMS THIS DIVISION

DIVISION 10 – SPECIALTIES

NO ITEMS THIS DIVISION

DIVISION 11 - EQUIPMENT

DIVISION 12 - FURNISHINGS

NO ITEMS THIS DIVISION

DIVISION 13 - SPECIAL CONSTRUCTION

NO ITEMS THIS DIVISION

DIVISION 14 - CONVEYING EQUIPMENT

NO ITEMS THIS DIVISION

FACILITY SERVICES SUBGROUP

DIVISION 21 - FIRE SUPPRESSION

NO ITEMS THIS DIVISION

DIVISION 22 – PLUMBING

DIVISION 23 - HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

NO ITEMS THIS DIVISION

DIVISION 25 - INTEGRATED AUTOMATION

NO ITEMS THIS DIVISION

DIVISION 26 - ELECTRICAL

DIVISION 27 - COMMUNICATIONS

NO ITEMS THIS DIVISION

DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

NO ITEMS THIS DIVISION

SITE AND INFRASTRUCTURE SUBGROUP

DIVISION 31 - EARTHWORK

DIVISION 32 - EXTERIOR IMPROVEMENTS

DIVISION 33 - UTILITIES

DIVISION 34 - TRANSPORTATION

NO ITEMS THIS DIVISION

DIVISION 35 - WATERWAY AND MARINE CONSTRUCTION

NO ITEMS THIS DIVISION

PROCESS EQUIPMENT SUBGROUP

DIVISION 40 - PROCESS INTEGRATION

DIVISION 41 -MATERIAL PROCESSING AND HANDLING EQUIPMENT

NO ITEMS THIS DIVISION

DIVISION 42 - PROCESS HEATING, COOLING AND DRYING EQUIPMENT

NO ITEMS THIS DIVISION

DIVISION 43 - PROCESS GAS AND LIQUID HANDLING, PURIFICATION AND STORAGE EQUIPMENT

NO ITEMS THIS DIVISION

DIVISION 44 - POLLUTION AND WASTE CONTROL EQUIPMENT

NO ITEMS THIS DIVISION

DIVISION 45 - INDUSTRY-SPECIFIC MANUFACTURING EQUIPMENT

NO ITEMS THIS DIVISION

DIVISION 46 - WATER AND WASTEWATER EQUIPMENT

NO ITEMS THIS DIVISION

DIVISION 48 - ELECTRICAL POWER GENERATION

NO ITEMS THIS DIVISION

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PART 1 – GENERAL

1.01 SCOPE OF WORK

A. The Work to be done under this Contract and in accordance with these Specifications consists of furnishing of equipment, superintendence, labor, skill, material, and all other items necessary for the Cedar Creek Water Pollution Control Plant Various Improvements Contract No. S3C067-13G located at the Cedar Creek Water Pollution Control Plant, Nassau County, New York.

B. The broad scope of this project is to replace the existing 250,000-gallon Cedar Creek Water Pollution Control Plant (WPCP) Ground Storage Tank with a glass-lined to bolted steel 260,000-gallon tank located at the Northern side of the Cedar Creek WPCP Wantagh, New York.

C. The principal features of the Work to be performed and equipment to be provided for this Project under this Contract includes:
   1. All labor, equipment, fees, permits, and other related costs necessary for
      a. Preliminary site work including; utility mark-out, erection of safety fencing, erosion control facilities, temporary construction fencing.
      b. Design and construction of new concrete tank foundation on micropiles.
      c. Installation of a new 260,000-gallon nominal capacity glass-fused to steel water storage tank, including all incidentals.
      d. Modifications to existing site piping including but not limited to:
         a. Installation of fittings and valves on the existing Cedar Creek WPCP Storage Tank 10” and 12” common inlet/outlet water mains. Existing Cedar Creek WPCP Storage Tank to remain in service during construction.
         b. Installation of new 10” and 12” water main and associated fittings and valves.
      e. Site grading and drainage work.
      f. Installation of all tank accessories.
      g. Installation of radar level sensor connected to SCADA and associated electrical connections.
      h. New water main connections to tank.
      i. Final rinse and cleaning of tank interior.
      j. Final restoration of disturbed areas.
      k. Project closeout submittals.
   2. The foregoing stated in Paragraph 1.01.B is a general description only and shall not be construed as a complete description of the Work to be performed for this Project.
   3. Contractor parking shall be as designated by County and Veolia or in approved Contractor staging areas as noted on the contract documents.

D. Delays due to lack of available labor, supervision, equipment, etc. will not be acceptable.

E. The existing storage tank will be maintained in continuous operation by the County during the entire construction period. Work under this Contract shall be so scheduled and conducted by the Contractor that such Work will not impede operation of the existing tank. In performing the Work shown and specified, the Contractor shall plan and schedule his Work to meet the storage tank operating requirements.

F. The construction sequence, as described in Section 020123, Maintenance of Plant Operations, must be maintained so that the County will meet the New York State Pollutant Discharge Elimination System Permit requirements for the Plant.

1.02 GENERAL

A. The Instructions to Bidders, Agreement, General Conditions, and Division 1, General Requirements, specifications shall apply to all Work under the Contract for this Project.

B. Where articles of the Instructions to Bidders, Agreement, and General Conditions are repeated in the Sections of Division 1, General Requirements, it is intended to elaborate or qualify such articles. It is not intended that other articles of the above documents shall be omitted or that additional requirements set forth in the above documents and noted herein shall be excluded from Contract requirements unless specifically noted as such hereinafter.

C. Where the words "Contract" and "Contractor" are used in Sections of Division 1, General Requirements, they shall apply equally to all parties entering into agreements with the County to perform Work specified herein and to all Contracts derived from said agreements.

1.03 CONTRACT DOCUMENTS

A. The Contract Documents consist of the Notice and Instructions to Bidders, Bid Bond, Proposal, Agreement, General Conditions, the Technical Specifications, and the Contract Drawings.

1.04 GENERAL ARRANGEMENT

A. The Contract Drawings indicate the extent and general arrangement of the Work. The specific equipment proposed for use by the Contractor on the Project may require changes in the construction detailed on the Contract Drawings, and all such changes shall be performed in accordance with the requirements of the General Conditions, Article GC 17, "Materials and Equipment, Approvals, Substitutions and Deviations", and shall be made without additional cost to the County and shall include the increase in costs of the other Contracts.

B. In the preparation of the revised plans, clearance, access, walkway widths, stairways, headroom and other building and equipment layout features shall be equal to those shown on the original Plans. All materials involved in the redesign shall conform to the applicable provisions of the Technical Specifications.

1.05 TIME OF WORK

A. Overtime work by the Contractor necessary to conform to the requirements of Division 1, General Requirements, Section 020123, Maintenance of Plant Operations, shall be considered as normal procedure under this Contract, and the Contractor shall make no claims for extra compensation as a result thereof. The Contractor shall be prepared to work around the clock and supply multiple work crews as necessary to complete the Work including testing and acceptance as specified, within the specified time frame and the time of completion set forth in the Contract Documents.

B. The normal working hours for the project are between 7:00 AM and 3:30 PM Monday through Friday. When required to meet the Contract Completion dates, the Contractor is advised that they shall work scheduled overtime, or second shifts as needed. The Contractors shall have sufficient construction materials, labor, equipment, tools, and supervision to support scheduled overtime or second shifts when required.

C. It is understood that the Contractor has reviewed the schedule and has included in their bid sufficient monies to meet the schedule and will make no claim for extra compensation because of additional costs to meet scheduled dates.

D. The Contractor is advised that they will be directed to take remedial action as necessary to recover lost time on any critical items as determined from the Construction Schedule.

E. If it shall become imperative to perform Work at night, the County shall be informed at least 24 hours in advance Monday through Friday of Work proposed to be done during off hours. Temporary lighting and all other necessary facilities for performing and inspecting the Work shall be provided as required and as specified in Division 1, Section 015000, Temporary Facilities and Controls, or as directed by the Engineer.

F. Unless otherwise specifically permitted, all Work that would be subject to damage shall be stopped during inclement, stormy, or freezing weather. Only such work that will not cause injury to workmanship or materials will be permitted. The Contractor shall carefully protect the Work against damage or injury from the weather, and when Work is permitted during freezing weather, provide, and maintain approved facilities for heating the materials and for protecting the finished Work.

G. The Contractor shall require permission, in writing, to perform contractual work outside the regular County working hours of 7:00 AM to 3:30 PM, Monday through Friday, or on official County holidays. This written request should be received by the County Monday through Friday at least 24 hours in advance of beginning the work. The Contractor is responsible for coordination with the County Engineer and/or his duly authorized representative, prior to the start of the work to determine the dates of observance of the official County holidays that may occur during the course of the Contract. The official County holidays are:
   1. New Year's Day
   2. Martin Luther King, Jr. Day
   3. Lincoln's Birthday
   4. Washington's Birthday
   5. Memorial Day
   6. Independence Day
   7. Labor Day
   8. Columbus Day
   9. Election Day
   10. Veteran's Day
   11. Thanksgiving Day
   12. Friday after Thanksgiving Day
   13. Christmas Day

H. Failure of the Contractor to consider official County holidays during the preparation of their work plans and schedules shall not be cause for a delay claim against the County.

I. Contractor shall obtain permission from Owner, Owner’s Representative and/or Plant management and staff prior to prosecuting any portion of the Work beyond the standard working days or hours. Should circumstances arise during the course of the Contract, where the Contractor works outside of the County’s regular working hours (7:00 am to 3:30 pm, or as otherwise established for the project) or on weekends or official County holidays, regardless if this work is performed as a result of the Contractor’s request or as required by the contract documents, or as required by the approved baseline schedule (resource loaded); the Contractor will reimburse the County for the cost of providing inspection and/or plant assistance, at the rate of $175 per hour per staff member. The Owner, Owner’s Representative and Plant management and staff will review the scope of the operations and determine on a case-by-case basis the extent of construction oversight that may be required. Furthermore, failure of the Contractor to have considered such contingency cost in his bid price shall not be cause for an additional cost claim to the County.

1.06 WORK BY OTHERS

A. County will perform the following work:
   1. Operate all Final Storage Tank valves and functions as deemed necessary.

1.07 REGULATORY AGENCY ACCESS TO CONSTRUCTION SITE

A. Whenever construction work is in progress or preparation, the Contractor shall permit access and inspection and shall provide proper and necessary facilities to the representatives of the County, Engineer and Regulatory Agencies including, but not limited to, the New York State Department of Environmental Conservation and the New York State Environmental Facilities Corporation.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 011100

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Site Utilization Plan requirements

1.02 SITE UTILIZATION PLAN REQUIREMENTS

A. Prepare a Site Utilization Plan (SUP) for each site showing staging areas, parking areas, stockpile areas, debris container areas, unloading areas, and trailer areas for review by the Owner and Engineer. The length and amount of meetings necessary to develop and adopt a SUP shall be as required.

B. Meeting(s) will be held at the site with all concerned parties to assist the Contractor in developing the criteria for the plan. During these meeting(s), all parties will present their needs and requirements for site utilization. As a minimum, each Contractor shall be allocated a portion of the available staging/parking/material storage area. Representatives from the local municipality or utility companies may be attending. The requirements of the local municipality and utility companies shall be incorporated into the SUP.

C. Prepare a draft site plan that attempts to incorporate the needs of all concerned parties. Another meeting will then be held at the site to review and present the plan. The plan shall then be revised at that meeting and adopted for use if it is acceptable to all relevant parties. If all parties cannot agree on an acceptable plan, then the Engineer will establish the Site Utilization Plan without any claims from the Contractor.

D. The Contractor shall understand the importance of a workable Site Utilization Plan and also understands that the Owner and Engineer may be required to select a plan to adopt that is not ideal to the planned construction activities anticipated before the bid was submitted. The Contractor shall not submit claims for damages associated with site utilization.

E. If a Site Utilization Plan as stipulated above is not prepared, then the Owner reserves the right to back charge the Contractor for the costs associated with having a Site Utilization Plan developed.

F. If the Contractor fails to participate or attend the meetings scheduled to develop the Site utilization Plan then the Contractor will forfeit any right to comment on the plan that is developed.

PART 2 - PRODUCTS

Not Used

PART 3 - EXECUTION

Not Used

END OF SECTION

SECTION 011813 – PROJECT UTILITY SOURCES

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Work includes all labor, materials, equipment, and incidentals required to mark out and protect all public or private utilities, including concrete encased piping, within or adjacent to the Contract area.

B. The Contractor is specifically directed to become familiar with the existence of aerial, surface, or subsurface structures of municipal and other public or private service corporations within the construction site.

C. A careful search has been made, in good faith, and known public or private utilities within or adjacent to the Contract area are shown in their approximate locations on the Contract Plans. However, there is no guarantee that all existing utilities have been found. All utilities may not be shown on the Contract Drawings.

D. The Contractor's attention is also directed to the fact that during the life of the facility, the County and operators of utilities may make changes in their facilities.

E. The Contractor shall determine the exact locations and elevations of all pertinent structures, utilities and facilities before construction work and new installations commence.

F. Conflict between existing structures, utilities and facilities and new work shall be ascertained by the Contractor and called to the attention of the Engineer.

G. The Contractor shall cooperate with the County and public utility corporations whose structures (aerial, surface or subsurface) are within the limits of or along the outside of the construction areas to make it possible for them to maintain uninterrupted service.

H. The Contractor shall conduct operations in such a way as to delay or interfere as little as practicable with the work of utility corporations.

I. The Contractor shall give the County and public utility corporations involved reasonable notice Monday through Friday, but not less than 48 hours in advance of operations, which may or will affect their structures.

J. The Contractor shall protect, in a suitable manner, all utilities encountered, including concrete encased piping, and shall repair any damage to structures, utilities and facilities caused by operations.
   1. If the nature of the damage is such as to endanger the satisfactory functioning of the utilities and necessary repairs are not immediately made by the Contractor, the work may be done by the respective owning companies and the cost thereof charged against the Contractor.

K. The Contractor shall take these conditions into consideration in making up the bid.

L. It is understood and agreed that the Contractor has considered during preparation of the bid all of the permanent and temporary utility appurtenances and that no additional compensation will be allowed for any delays, inconveniences or damage sustained by him due to any interference from the utility appurtenances.

1.02 PUBLIC AND PRIVATE UTILITY MARKOUTS

A. The Contractor shall be required to provide utility mark outs for all private and public utilities. The limits for these mark outs shall be the project limit shown on the Engineering Drawings.

1.03 TEST PITS

A. Test holes shall be performed by air vacuum excavation key-hole technology or other non-destructive techniques on existing utilities. One call notification and permit applications shall be made prior to test hole excavation as necessary.

B. The test holes shall be staked at the site by contractor personnel utilizing a tape or survey instrument as deemed necessary. Test hole openings shall be a minimum 8 x 8 and typically not larger than 12 x 12 . Excavate to expose the utility in a careful manner with the utmost concern for the safety of personnel, the public and surrounding property. Complete a field test hole form for each excavation that indicates at a minimum parameters required by the ASCE/CI Standard 38-02, which includes: depth to the utility, outside diameter, height of conduits or encasement, utility material, pavement type/ thickness and general soil type.

C. Place permanent marker over a reference point on the utility flush with grade. Typically, this reference point is the centerline of pipes or the edge of concrete structures. A minimum of three (3) ties shall be taken to the permanent marker. The depth to the reference point on the utility shall also be measured plumb to the permanent marker.

D. Backfill excavation utilizing excavated materials or a self-compacting aggregate. Pavement restoration shall be made in accordance with pavement requirement in the Contract Documents.

E. Test hole permanent markers shall be located using conventional or GPS survey equipment. The test hole markers shall be directly located to provide horizontal and vertical coordinates for the locations relative to the project coordinate system.

F. Do not backfill test holes until directed by the Engineer. Photographs of exposed piping shall be taken by the Contractor and kept on file for the duration of the project. Duplicate prints shall be provided to the Engineer. Annotate on the back of each print the location of the photograph, the name of the exposed line, and the date it was taken. Take photographs using a digital camera. The digital file shall be provided to the Engineer. All prints shall be 4 inches by 6 inches. Trenching for new buried pipelines and excavation for facilities shall not be started until the locations of existing pipes and utilities are verified.

1.04 MEASUREMENT AND PAYMENT

A. No separate payment for the items “Protection of Utilities” will be made. The costs of same shall be included in the Base Bid.

1.05 SUBMITTALS

A. The Contractor shall submit the proposed utility subcontractor for approval.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 012100 – ALLOWANCES

PART 1 – GENERAL

1.01 DESCRIPTION

A. The allowances described below are to provide specific services, materials or work related to the Cedar Creek Water Pollution Control Plant Various Improvements – Contract No. S3C067-13G.

B. The use of the allowances by the Contractor shall only be by written authorization or instruction from the Engineer and Owner.

C. Any amounts not expended at the completion of the work shall be deducted from the final payment to the Contractor.

D. A change order will be processed to increase the allowance if the amount becomes insufficient to complete the work of the Contract.

1.02 SCHEDULE OF ALLOWANCES

A. General Construction Contract:

1. Item 2: An allowance in the amount indicated in the Proposal for furnishing all labor, materials, equipment and incidentals for unforeseen conditions and associated additional work.

1.03 BASIS FOR PAYMENT

A. Item No. 2: the allowance for unforeseen conditions and associated additional work, as directed or authorized by the County, shall cover the cost of labor, materials, equipment and incidentals plus overhead and profit, computed in accordance with the requirements of the Agreement, Article XXII., “Extra Work”.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 012100

SECTION 012973 – SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

A. Submit a Schedule of Values allocated to the various portions of the work, within twenty (21) days after the effective date of the Agreement.

B. Upon request of the Engineer, support the values with data which will substantiate their correctness.

C. The accepted Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.02 RELATED REQUIREMENTS

A. General Conditions of the Construction Contract

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:
   1. Title of Project and location.
   2. Engineer and Project number.
   3. Name and Address of Contractor.
   4. Contract designation.
   5. Date of submission.

B. Schedule shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.

C. Identify each line item with the number and title of the respective Technical Specification Section.

D. For each major line item list sub-values of major products or operations under the item.

E. For the various portions of the work:
   1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
   2. For items on which progress payments will be requested for County approved stored materials, break down the value into:
      a. The cost of the materials, delivered and unloaded, with all taxes paid. Paid invoices are required for materials upon request by the Engineer.
      b. The total installed value.

F. The sum of all values listed in the schedule shall equal the total Contract Sum.

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

A. Submit a sub-schedule of unit costs and quantities for:
   1. Products on which progress payments will be requested for County approved stored products.

B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.

C. The unit quantity for bulk materials shall include an allowance for normal waste.

D. The unit values for the materials shall be broken down into:
   1. Cost of the material, delivered and unloaded at the site with all taxes paid.
   2. Copies of invoices for component material shall be included with the payment request in which the material first appears.
   3. Paid invoices shall be provided with the second payment request in which the material appears or no payment shall be allowed and/or may be deleted from the request.

E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 012987 – MEASUREMENT AND PAYMENT

PART 1 – GENERAL

1.01 DESCRIPTION

A. Payment of the Work of the Contract will be made on the basis of the bid prices, as agreed upon and stipulated in the signed Contract Agreement. Payments include the furnishing of all labor, materials equipment and incidentals required to complete the work of the Contract as shown on the Contract Drawings and as specified.

B. A schedule outlining the procedures for measurement and payment for the contractor is included below. The schedule includes measurement and payment for the lump sum bid item and various unit price items only.

1.02 CONTRACT NUMBER S3C067-13G

A. Lump Sum Bid - Item No.1: Cedar Creek Water Pollution Control Plant Various Improvements:
   1. Measurement for payment of the Lump Sum Bid Item No. 1 shall be made in accordance with the Construction Agreement. The measurement shall be the percentage of work performed and in place as of the date of the payment request and shall be determined for each item included on the schedule of values. The measurement shall be documented by calculation of costs incurred, quantities in place, and invoices of materials and equipment supplied, as well as certification of the Contractor as to the accuracy of the measurement.
   2. Payment shall fully compensate the Contractor for furnishing all labor, materials, equipment and incidentals required to complete the work, as specified and shown in the Contract Documents, except for unit price items, all as contained in the Bid Proposal and agreed upon in the Construction Contract.
   3. Payment of the lump sum shall also compensate the Contractor for insurance, bonds, furnishing and removing the temporary facilities as specified in Sections 017000 and 015000 and as shown on the drawings, and all other services required for the satisfactory completion of the work of this contract.

1.03 UNIT PRICE ITEMS

A. Unit Price Item Nos. 3 and 4 shall be as listed in the Proposal and in Section 012200. Payment shall fully compensate the Contractor for furnishing all labor, materials, equipment and incidentals required to complete the work as specified and shown in the Contract Documents.

1.04 ALLOWANCES

A. Allowances will be paid in accordance with the provisions of Section 012100.

1.05 ESTIMATE OF QUANTITIES

A. The estimated quantities for unit bid prices, as listed in the Proposal, are approximate only and are included solely for the purpose of comparison of Bids. The County does not expressly or by implication agree that the nature of materials encountered below the surface of the ground or the actual quantities of material encountered or required will correspond therewith and reserves the right to increase or decrease any quantity or to eliminate any quantity as the County may deem necessary. The Contractor will not be entitled to any adjustment in the unit bid price as a result of any change in an estimated quantity and agrees to accept the aforesaid unit bid price as complete and total compensation for any additions or deductions caused by a variation in quantities as a result of a more accurate measurement, or by any changes or alterations in the Work approved by the County, and for use in the computation of the value of the Work performed for Partial Payments.

1.06 RELATED PROVISIONS ELSEWHERE

A. Payments to the Contractor: Refer to the Agreement and the General Conditions.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 - GENERAL

1.1 DESCRIPTION

A. The work shall consist of preparing, submitting, and maintaining a computerized CPM (Critical Path Method) progress schedule using Primavera P6 software.

B. The purpose of the computerized CPM progress schedule is to ensure timely completion of the contract and to establish a standard methodology for time adjustment analysis based on the principles of the Critical Path Method of Scheduling.

C. For this specification, 'Engineer' means County authorized Construction Manager.

D. The Contractor shall ensure that any and all computer files submitted to the Engineer are in a format that can be imported directly using Primavera P6 software, version 16.2 or later.

E. The Contractor shall retain a CPM Consultant, approved by the Engineer, to assist in the development and preparation of the CPM schedule, and in subsequent schedule updating. The CPM Consultant shall have acceptable certifications such as AACE's Planning & Scheduling Professional (PSP), Project Management Institute's PMI-SP, or approved equal. The CPM Consultant is required to attend the Monthly Schedule Update Meetings. The Contractor is deemed to have included in the Bid price sufficient monies to pay all expenses required to develop the CPM Schedule and to guarantee its successful operation, implementation and maintenance.

1.2 DETAILS

A. PRE CONSTRUCTION SCHEDULE MEETING
   1. The Engineer will schedule and conduct a Pre-construction Scheduling Meeting with the Contractor within ten (10) working days after the contract has been awarded. The requirements of this specification will be reviewed at this meeting. Additionally, the following topics will be discussed:
      a. Specifics of any contract Time-Related Clauses.
      b. The representation in the schedule of the Time Related work.
      c. The calendar, activity coding, and resource definition requirements unique to and consistent with the contract.
      d. The Contractor's schedule methodology employed, proposed work sequence and any proposed deviations of sequences from the contract plans.
      e. The factors that the Contractor determines to control the completion of the project and any milestone completions contained therein.
      f. Narrative content for Initial Baseline and Monthly Updates.
      g. Schedule submission protocol for Initial Baseline and Monthly Updates.
   2. The Contractors attendance at the Pre-construction Scheduling Meeting is mandatory. No field work will be allowed, with the exception of set up of the field office, until this meeting is held.

B. INITIAL BASELINE CPM CONSTRUCTION SCHEDULE
   1. Within thirty (30) work days following the Notice to Proceed, the Contractor shall prepare and submit to the Engineer the Initial Baseline CPM Construction Schedule for the entire project. This submission shall include the electronic Schedule file and paper reports as required and approved by the Engineer.
   2. The Initial Baseline Schedule must be Cost and resource loaded and shall represent the Contractor's plan to construct the project. This schedule shall include all work and activities necessary to complete the project including but not limited to activities for the preparation, submittal, review, approval, fabrication, and delivery of all procurement related items. The

Initial Baseline CPM Construction Schedule must be set up to conform to the staging/phasing and other requirements defined in or required by the contract.

3. The Initial Baseline Schedule shall meet all interim milestone dates and shall not extend beyond the contract completion date.

C. SCHEDULE REQUIREMENTS

1. The Contractors Initial Baseline CPM Construction Schedule shall meet the following requirements:
   a. CPM ACTIVITY NETWORK FORMAT - The schedule network shall use the Precedence Diagraming Method.
   b. PROJECT DEFINITIONS - The following project specific properties within the schedule shall be defined:
      1) CALENDAR - All calendars created shall encompass and account for the total duration of the contract time period. The standard calendar shall be 8-hour days, five days per week and shall account for holidays and non-working days as defined in the contract documents. Additional calendars shall be created and included as required for:
         a. Work week (5 or 6 day). (When or if the contractor elects to utilize a 6-day work week he shall be responsible for the county's overtime costs as applicable by the contract requirements)
         b. Seasonal restrictions (asphalt, landscape, etc.).
         c. Concrete curing/calendar days.
         d. Any project specifics as required by the Engineer.
         e. Expected and contemplated weather conditions shall be accounted for in the schedule and described in the narrative.
      2. ACTIVITY CODE- As a minimum following activity codes shall be established:
         a. Responsibility - The party responsible for each activity. Only one party can be responsible for an activity. Include Values for "Nassau County Department of Public Works (NC)", "Prime Contractor" and third parties to the contract as appropriate (utilities, etc).
         b. Phase- Phasing consistent with Contract plans where each activity is performed; Include Values for "None", and "Project Wide".
         c. Location - Location of activity work by Stationing; Include Value for "None", and "Project Wide".
         d. Type- The type of work for each activity; Include a Value for Administrative"
         e. Added Work- Work added to the Contract and incorporated into the schedule with the Engineers Approval.
         f. As Required by Project - Any coding unique to or as required by the Engineer to facilitate the use and analysis of the Schedule. This coding shall be established in consultation with the Engineer at the Pre-construction Scheduling Meeting.
      3. RESOURCES - The Resource Dictionary shall be established as required by the Engineer. The Resource Dictionary shall be limited to Labor and Equipment. Labor may be represented by work crews. The composition of each crew must be detailed and included as an appendix to the Narrative Report. Sub-Contractors shall be represented as a labor crew(s).
      4. COST LOADING – Basis of cost loading will be the approved Schedule of Values.
      5. ACTIVITY DATA
         a. ACTIVITY IDENTIFICATION - Each activity shall have a unique identifier. The identifier may be alpha-numeric, but at a minimum must be a unique number.
         b. ACTIVITY DESCRIPTION - Each activity shall be unambiguously described. Descriptions such as "construct 30% of Y" are unacceptable. Activities shall be discrete to the extent necessary to accurately schedule the work.

c. ACTIVITY DURATION - Durations of individual work activities shall not exceed twenty (20) working days. The minimum activity duration increment is one full day. Durations of individual shop drawing review activities may exceed fifteen working days and shall be consistent with Contract Requirements. Exceptions to this will be reviewed by the Engineer on an activity-by-activity basis. If requested by the Engineer, production rates or other supporting information shall be supplied justifying the reasonableness of any given activity time duration. A Method Statement including the labor, equipment, production rates and any additional information, required to achieve a given activity shall be supplied within 5 working days when requested by the Engineer.

d. ACTIVITY RELATIONSHIPS – Activity relationships shall be finish-to-start with no lags unless directed otherwise by the Engineer. Contractor requests for exemptions will be made on a case by case basis. Each activity with the exception of the required “Project Notice To Proceed” and “Completion” activities shall have a predecessor and a successor activity relationship.

e. ACTIVITY START and FINISH DATES - The earliest start date, earliest finish date, latest start date, and latest finish date shall be calculated for each activity.

f. ACTIVITY TOTAL FLOAT - The total float shall be calculated for each activity. Total float is the full amount of time by which the start on an activity may be delayed without causing the project to last longer.

g. ACTIVITY CALENDARS - The appropriate calendar assignment shall be made to each activity

h. ACTIVITY CODES - Coding shall be assigned to each activity from the defined activity dictionary. Each code shall have a value assigned in a given activity.

i. ACTIVITY CONSTRAINTS - The start or completion of any activity shall not be constrained. Exceptions to this must receive prior approval in writing by the Engineer. A “Must¬ Finish-By” Date for the overall project is a constraint and must be pre-approved by the Engineer.

j. ACTIVITY RESOURCES- The schedule shall be “Resource” loaded as required by the Engineer. The resources required to accomplish each activity shall be assigned to that activity from the ‘Resource Dictionary”

6. REQUIRED ACTIVITIES - The following activities shall be incorporated into the Schedule:

Activity ID	Activity Description	Activity Type	Logic Relationship
000010	Contract “Notice to Proceed”	Start Milestone	No Predecessors to this First Schedule Activity
999999	Completion	Finish Milestone	No Successors to this Last Schedule Activity

7. DATA DATE - The Data Date and Project Start Date in the Initial Baseline Schedule shall be the NOTICE TO PROCEED DATE. The Data Date for each Monthly Update shall be the first work day of the month.

D. REVIEW AND ACCEPTANCE OF THE INITIAL BASELINE CPM CONSTRUCTION SCHEDULE -

1. The Contractor shall submit to the Engineer the following items to facilitate review of the Initial Baseline CPM Construction Schedule:
   a. Narrative- A statement explaining the general sequence of work in the Contractor's schedule, a detailed definition of the work on the Critical Path, a statement regarding the

meeting of any Time Restrictive Clause dates, and the explanation of any other ambiguities in the schedule.

2. The following Activity Reports generated from the software shall be provided or as required and approved by the Engineer:
   a. Critical Path Activity Sort - The activities that comprise the projects Critical Path. The list shall start with the first activity in the path and then ascend by Early Start date to the final activity in the path.
   b. Time Related Activity Sort - For the activities necessary to complete the work within each specific Time Frame provision in the contract, shall be listed. The list shall start with the first milestone activity and then ascend by Early Start date to the final milestone activity in the network comprising each Time Frame period. Include a Critical Path activity sort for each specific Time Frame in the contract.
   c. Constraint Activity Sort - Listing of Constrained Activities and type of constraint.
   d. Listing of Calendars and Activity Coding incorporated in the Schedule
3. Electronic copies of the Initial CPM Construction Schedule shall be provided in format approved by the Engineer.
4. The Engineer will review the Initial Baseline CPM Construction Schedule and forward any comments, revisions, or requests to the Contractor. Within ten (10) work days of the Engineer's reply, the Contractor shall make adjustment to the Initial Baseline CPM Construction Schedule in accordance with the Engineer's comments and resubmit copies for review consistent with the above directives.
5. Upon final revisions, the Contractor shall submit electronic file copies of the Initial Baseline CPM Construction Schedule to the Engineer. A sort of activities scheduled to start (ES) & finish (EF) in the next update period shall be included. The Logic Diagram shall be submitted as directed by the Engineer. The final submission shall be submitted for approval within five (5) work days of the Contractor's receipt of the final comments by the Engineer.
6. Approval of the Initial Baseline CPM Construction Schedule by the Engineer shall not be construed to imply approval of any particular method or sequence of construction or to relieve the Contractor of providing sufficient materials, equipment, and labor to guarantee completion of the project in accordance with the contract proposal, plans, and specifications. Approval shall not be construed to modify or amend the completion date. Completion dates can only be modified or amended by standard contractual means.
7. Failure to include in the Initial Baseline CPM Construction Schedule any element of work required for the performance of the contract shall not excuse the Contractor from completing all work required within the completion date(s) specified in the contract.

E. SCHEDULE UPDATES

1. MONTHLY PROGRESS UPDATES

   The Contractor shall update the schedule monthly. The schedule shall be updated to include all work and progress up to and including the last working day of the month. This will establish the "Data Date". The Monthly update shall detail progress based on actual dates of activities started and completed, the percent of work completed to date on each activity started but not yet completed and the status of procurement of critical materials. The updated schedule data shall be submitted in an electronic file format acceptable to the Engineer.

2. A Narrative Report is required for each update and shall provide the following information:
   a. Contractors transmittal letter to the Engineer stating the update period and schedule "Data Date".
   b. Work started, completed and ongoing during the update period by activity with "Actual Dates".
   c. Description of current Critical Path and any change from previous Critical Path.
   d. Any activities added or deleted and any proposed changes in Activity Logic (Engineer's approval in writing is required).
   e. Current Delays or Advancements
      1) Delayed or Advanced Activities.
      2) Proposed corrective action and schedule adjustments to address any Delays.

3) Impact of Delays or Advancement on other activities (duration, ES,EF,LS,LF), milestone and completion dates.
4) Impact of Delays or Advancement on the Critical Path.

f. Outstanding Items that effect the schedule and status thereof (including but not limited to):
1) Permits.
2) Shop Drawings.
3) Change Orders.
4) Reviews of submittals.
5) Approvals.
6) Fabrication and Delivery.

g. Scheduled Completion Date Status
1) Contract Completion.
2) Interim Milestones / Time Frame if any.

3. The following Activity Reports generated from the Software shall be provided:
a. Current Critical Path Activity Sort
b. Near Critical Activities Sort
c. Report of Activities scheduled to start (ES) & finish (EF) in the next Monthly update period.
d. Any other “Report” as directed by the Engineer and/or as discussed in the pre-construction scheduling meeting.

4. The Monthly Progress Updates shall be submitted to the Engineer within five (5) work days of the “Data Date”. The Engineer shall prepare a written response within five (5) work days of receipt of the Monthly Update approving, approving with comments, or returning for resubmission within five (5) work days.

5. If the Contractor fails to comply with the Monthly Progress Update submission requirements the Commissioner reserves the right to withhold any or all contract payments.

6. Monthly Schedule Meetings and Reports
a. Monthly, on a date established by the Engineer prior to the Data Date, a CPM Progress Meeting will be held, at which time the schedule update will be reviewed. The meeting shall be attended by the Engineer and representative(s) of the Contractor including the scheduling consultant. The Contractor representative(s) at the meetings shall have the competence and authority to make any necessary decisions and their statement shall commit the Contractor to the agreed procedures, sequencing of Work, coordination and time schedules.
b. Prior to the meeting, the CPM scheduling consultant shall obtain, through any required means including Site meetings, the necessary information to update the CPM schedule to reflect progress to date and to update/revise the schedule for the balance of the Project. The updated schedule and draft narrative report shall be furnished to the Engineer at least 48 hours prior to the meeting and be distributed by the Contractor in hard copy at the meeting for review. To update the CPM schedule, the Contractor shall:
1. Enter actual start and completion dates for those Activities started and/or completed during the previous reporting period
2. For Activities in progress, indicate the Remaining Duration correlating to an accurate forecasted completion date and physical percentage complete to date (Percent Complete is to reflect the actual quantity of Work completed, and is separate from any actual or Remaining Duration calculation). Review, and revise as necessary, the network logic for the Remaining Duration of the Work from the update to the estimated completion date
3. For Activities not yet started, review, and revise as required, the necessary Logic, the Durations of Work and the estimated start and completion dates
4. Enter, for each applicable Activity, actual installed quantities information
c. The total Duration to be initially added to any schedule update reflecting the Change Order Activities from identification to the approval of any specific change order shall be in approved by the Engineer and shall be incorporated into the monthly schedule update following the identification of the changed in Work. The forecasted construction Activities

shall be logically tied to the appropriate predecessor and successor base Contract Activities and contain all of the required Logic, Duration, Coding and Resource/Cost Loading specified for the detailed CPM schedule activities.

d. In the event the Contractor begins performance in the field of Extra Work during the update period, the monthly progress schedule update shall reflect the actual start date of the Work, and any predecessor Logic ties or restraints shall be broken in order to accurately forecast completion of the identified Extra Work Activity. This will allow for accurate forecasting of the successor Work Activities and completion Milestones.

e. Default progress data provided from the scheduling system is not be allowed. Actual start and finish dates and Remaining Durations of Activities shall not be automatically updated by default mechanisms that may be included in CPM scheduling software systems. Actual start and finish dates on the CPM schedule shall match those dates provided from the Contractor's Daily Quality Control Reports. Failure of the Contractor to document the actual start and finish dates on the Contractor Daily Quality Control Report for every in-progress or completed Activity and ensure that the data contained on the Contractor Daily Quality Control Reports is the sole basis for schedule updating shall result in the disapproval of the Contractor's submittal.

f. Activities that have reported progress without predecessor Activities being completed (out-of-sequence progress) will not be allowed except on a case- by-case basis with the approval of the Engineer. A written explanation for each instance shall be included in the monthly submittal.

g. The Contractor shall not constrain the schedule with artificial Logic ties and/or constraint dates and/or any other scheduling techniques that may distort the Activity Float and Total Float associated with the critical path Activities and the schedule in general.

F. TOTAL FLOAT OWNERSHIP

1. Total Float belongs to the contract and shall not be considered as available for the exclusive use or benefit of either the County or the Contractor. Total Float is the number of days an activity may be delayed without extending the completion of either the project or an interim milestone. Float is available on a first-come, first-served basis to all identified “Responsible” parties in the schedule.

G. FLOAT MANIPULATION NOT PERMITTED

1. The Schedule shall not sequester float through such strategies as calendar manipulation, resource/labor manipulation or the extension of activity durations to fill up available float time. The Initial Baseline CPM Construction Schedule shall not attribute negative float to any activity.

H. CHANGES TO THE SCHEDULE

1. The Initial Baseline CPM Construction Schedule shall accurately reflect the manner in which the Contractor intends to proceed with the project. Changes to the schedule (the addition or deletion of activities, logic changes, and duration changes) shall be submitted in writing to the Engineer for approval and inclusion in the next Monthly Progress Update. The process of comparing the Schedule Update to Baseline shall be followed throughout the contract. Revision to any contract milestones, or contractually mandated schedule provisions will not be permitted without written authorization from the Engineer.

I. CRITICAL ACTIVITIES AND BASIS FOR TIME ADJUSTMENTS

1. The measure for Time Adjustments in the schedule shall be based on the criticality, and responsibility of the delay or advancement. Criticality is defined as the presence of the delayed or advanced activity on the projects Critical Path. The Critical Path is defined to be the longest continuous chain of activities through the schedule network that establishes the minimum overall duration in the absence of constraints in the program software. Time adjustment does not mean an extension of time for this contract.

J. CHANGES TO THE CONTRACT

1. In the event a notice of a change to the contract is received the Contractor shall notify the Engineer in writing within 10 (ten) calendar days of the effect of such change to the schedule. Change to the contract includes, but is not limited to, extra work, change orders, work suspensions, changed condition, Value Engineering Change Proposal, etc. The effect of the change to the contract on the projects Critical Path shall be stated. Any proposed revisions to the Schedule to incorporate the change to the contract shall be stated. No changes shall be made to the Schedule without prior written approval of the Engineer. The approved changes shall be incorporated in the next Monthly Progress Update.

1.3 TIME IMPACT ANALYSIS

A. This analysis will be performed by the Engineer (CM's scheduler) based on schedule updates as accepted in monthly schedule updates.

B. Events, actions, and progress that cause delays or gains to the Project Schedule will be analyzed solely by the "Contemporaneous Period Analysis" method. The Contemporaneous Period Analysis evaluates delays or gains in the period in which it occurred. The analysis period for the purpose of this Specification shall be the period covered in each Monthly update to the schedule.

C. Impact of delay will be evaluated at the completion of the project. However, an interim extension of time for payment purposes only may be granted by the Commissioner at his or her sole discretion at the end of contractual completion date.

1.4 RECOVERY SCHEDULES

A. General Provisions for Recovery Schedules:
   1. When updated Progress Schedule indicates and the Engineer determines that the ability to comply with the Contract Times falls behind schedule due to delay attributed to the CONTRACTOR, the Contractor shall prepare and submit a Progress Schedule demonstrating responsible Contractor's plan to accelerate related work to achieve compliance with the Contract Times ("recovery schedule") for Engineer's acceptance.
   2. Submit recovery schedule within 10 work days after submittal of updated Progress Schedule where need for recovery schedule is indicated or include in next update as directed by the Engineer.

B. Implementation of Recovery Schedule:
   1. At no additional cost to OWNER, do one or more of the following: furnish additional labor, provide additional construction equipment, provide suitable materials, employ additional work shifts, expedite procurement of materials and equipment to be incorporated into the Work, and other measures necessary to complete the Work within the Contract Times.
   2. Item 1 above is also applicable when the Contractor is required to accelerate their Work to recover lost time
   3. Upon acceptance of recovery schedule by Engineer, incorporate recovery schedule into the next Progress Schedule update.

C. Lack of Action:
   1. The Contractor's refusal, failure, or neglect to take appropriate recovery action, or the Contractor's refusal to submit a recovery schedule and take appropriate recovery action, shall constitute reasonable evidence that CONTRACTOR is not prosecuting the Work or separable part thereof with the diligence that will ensure completion within the Contract Times. Such lack of action shall constitute sufficient basis for OWNER to exercise remedies available to OWNER under the Contract Documents.

1.5 METHOD OF MEASUREMENT

The CPM (Critical Path Method) Progress Schedule will be measured for payment on a Lump Sum Basis.

1.6 BASIS OF PAYMENT

The lump sum price per the schedule of values for the Critical Path Method Scheduling system shall include the cost of preparation and submission of the Initial Baseline Schedule and the preparation and submission of the monthly updates.

Payment will be made as follows:

A.	Upon submission of the Initial Baseline CPM Construction Schedule	20%
B.	Upon acceptance of the Baseline CPM Construction Schedule	20%
C.	The balance will be paid in equal monthly payments distributed over the remaining contract period after acceptance. These payments will be contingent on the submission of acceptable monthly updates.	60%

D. No additional payment over and above the lump sum price bid will be made for addition or deletion of work, delays, or any other reason whatsoever.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 013223 – SURVEYING

PART 1 – GENERAL

1.01 GENERAL

A. The General Construction Contractor shall establish at least two bench marks for use by all Contractors, in accordance with the General Conditions, Article GC 28, "Layout and Levels" and the Agreement, Article XXIX, "Character and Competency" and Article XXX, "Superintendence". The Contractor shall comply with this article.

B. Contractor shall:
   1. Provide civil, structural or other professional engineering services specified, or required to execute Contractor's construction methods.
   2. Develop and make all detail surveys and measurements needed for construction including slope stakes, batter boards, piling and pier layouts and all other working lines, elevations and cut sheets.
   3. Keep a transit and leveling instrument on the Site at all times and a skilled instrument man employed or obtained whenever necessary for layout of the Work.
   4. Provide all material required for benchmarks, control points, batter boards, grade stakes, and other items.
   5. Be solely responsible for all locations, dimensions, and levels. No data other than written orders of the Engineer shall justify departure from the dimensions and levels required by the Drawings.
   6. When requested by Engineer, provide such facilities as may be necessary for the Engineer to check line and grade points placed by the Contractor. The Contractor shall do no excavation, backfill or embankment Work until all cross sectioning necessary for determining pay quantities has been completed and checked by the Engineer.

1.02 CONTRACTOR'S FIELD ENGINEER

A. Employ and retain at the Site of the Work a field engineer capable of performing all engineering tasks required of the Contractor. Tasks included are:
   1. A projection of Work to be completed the following day must be submitted to the Engineer by 4:00 PM of the preceding workday. This projection must include:
      a. Location of all areas in which construction will be done, including the Contractor and his Subcontractors.
      b. Major construction equipment utilized.
      c. Equipment and materials to be installed.
   2. Provide all surveying equipment required including transit, level, stakes and required surveying accessories.
   3. Furnish all required lines and grades for construction of operations. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment.
   4. Maintain field office files and drawings, Record Drawings, and coordinate engineering services with Subcontractors. Prepare Layout and Coordination Drawings for construction operations.
   5. Check and coordinate Work for conflicts and interference and immediately advise the Engineer of all discrepancies noted.
   6. Cooperate with the Engineer in field inspections, as required

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. A qualified engineer or registered land surveyor, acceptable to the Engineer.

1.04 RECORDS

A. Maintain a complete, accurate log of all control and survey Work as it progresses.

B. On completion of foundation walls and major Site improvements, prepare a certified survey showing all dimensions, locations, angles and elevations of construction.

1.05 SUBMITTALS

A. When requested by the Engineer, submit a certificate signed by a registered Engineer or surveyor certifying that elevations and locations of Work are in conformance with the Contract Documents. Explain all deviations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 013223

SECTION 013233 – CONSTRUCTION PHOTOGRAPHS

PART 1 – GENERAL

1.01 DESCRIPTION

A. The Contractor shall engage the services of an experienced photographer, approved by the County, to take color job photographs and video as detailed under these specifications.

B. The photographer will be required to take preliminary photographs of the site prior to the commencement of work as directed by the Engineer.

C. Subsequent photographs as determined by the Engineer shall be taken during the construction phase.

D. The photographer shall visit the site prior to the start of construction, then every other week as the work progresses, additional visits may be required.

E. The quantities of job photographs specified herein supersede the quantities specified in the General Conditions, Article GC-37, Photographs.

1.02 MEASUREMENT AND PAYMENT

A. No separate payment for the item "Job Photographs" will be made. The costs of same shall be included in the Base Bid.

B. If less than five hundred (500) photographs are required, the Contractor shall credit the County fifteen dollars ($15.00) for each photograph under five hundred (500) photographs; should more than five hundred (500) photographs be required, the Contractor will be paid fifteen dollars ($15.00) for each photographs over five hundred (500) photographs.

PART 2 – PRODUCTS

2.01 PHOTOGRAPHS

A. A photograph shall be defined as one exposure.

B. A total of five hundred (500) photographs at the site shall be taken.

C. The County shall reserve the right to reject any photograph that is not clear or definitive. Any photograph so rejected shall be subtracted from the total exposures before computations for payment or credit under this section.

D. The prints and negatives shall be suitably mounted and labeled in loose-leaf type binders, which have protective covers for the prints, slides, and negatives.

E. The prints shall have indelibly printed on their reverse side of the following:
   1. Project Number
   2. Project Name
   3. Contract Number and Description
   4. Job Number
   5. Photo Number
   6. View and description indicating location of camera, general description of what photograph represents, and indicate this is a preliminary photograph. (A plot plan shall be submitted by the Contractor indicating location and photo number of all preliminary photographs.)
   7. Date picture was taken.
   8. Name of photographer and photographer’s firm.

9. Contractor's name.

F. An electronic copy containing all photos taken at the site shall be supplied on thumb drive and submitted to the Engineer for approval. Provide 2 USB thumb drives with copies of the photos.

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section specifies the general methods and requirements of submissions applicable to Shop Drawings, Product Data, Samples, Mock Ups, Construction Photographs, Construction or Submittal Schedules. Detailed submittal requirements are specified in the technical Sections.

B. All submittals shall be clearly identified by reference to Section Number, Paragraph, Drawing Number or Detail as applicable. Submittals shall be clear and legible and of sufficient size for presentation of data.

1.02 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

A. Shop Drawings
   1. Shop drawings as specified in individual Sections include, custom-prepared data such as fabrication and erection/installation (working) drawings, scheduled information, setting diagrams, actual shop work manufacturing instructions, custom templates, special wiring diagrams, coordination drawings, individual system or equipment inspection and test reports including performance curves and certifications, as applicable to the work.
   2. All shop drawings submitted by subcontractors shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.
   3. Check all subcontractor's shop drawings regarding measurements, size of members, materials and details to make sure that they conform to the intent of the Drawings and related Sections. Return shop drawings found to be inaccurate or otherwise in error to the subcontractors for correction before submission thereof.
   4. All details on shop drawings shall show clearly the relation 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.
   5. Submittals for equipment specified under Divisions 11 through 16 shall include a listing of all installations where identical or similar equipment has been installed and been in operation for a period of at least one year.

B. Product Data
   1. Product data as specified in individual Sections include, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing and printed product warranties, as applicable to the work.

C. Samples
   1. Samples specified in individual Sections include physical examples of the work such as sections of manufactured or fabricated work, small cuts or containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols and units of work to be used by the Engineer or Owner for independent inspection and testing, as applicable to the work.

1.03 CONTRACTOR'S RESPONSIBILITIES

A. Review shop drawings, product data and samples, including those by subcontractors, prior to submission to determine and verify the following:
   1. Field measurements
   2. Field construction criteria
   3. Catalog numbers and similar data
   4. Conformance with related Sections

B. Each shop drawing, sample and product data submitted by the Contractor shall have affixed to it the following Certification Statement including the Contractor's Company name and signed by the Contractor: "Certification Statement: by this submittal, I hereby represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contract requirements." The cover sheet shall fully describe the packaged data and include a listing of all items within the package. Provide to the Resident Project Representative a copy of each transmittal sheet for shop drawings, product data and samples at the time of submittal to the Engineer.

C. The Contractor shall utilize a 9-character submittal identification numbering system in the following manner:
   1. The first five digits shall be the applicable Section Number.
   2. The next three digits shall be the numbers 001 to 999 to sequentially number each initial separate item or drawing submitted under each specific Section Number.
   3. The last character shall be a letter, A to Z, indicating the submission, or resubmission of the same Drawing, i.e., "A=1st submission, B=2nd submission, C=3rd submission, etc. A typical submittal number would be as follows:

      03300-008-B
      03300 = Section for Concrete
      008 = The eighth initial submittal under this section
      B. = The second submission (first resubmission) of that particular shop drawing

D. Notify the Engineer in writing, at the time of submittal, of any deviations in the submittals from the requirements of the Contract Documents. All cost associated with any deviations shall be borne by the Contractor.

E. The review and approval of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from the responsibility for 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 therefor.

F. No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the approval or qualified approval of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to approved shop drawings and data shall not be permitted. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

G. Project work, materials, fabrication, and installation shall conform with approved shop drawings, applicable samples, and product data.

1.04 SUBMISSION REQUIREMENTS

A. Make submittals promptly in accordance with approved schedule and in such sequence as to cause no delay in the Work or in the work of any other contractor.

B. Contractor shall reference the General Conditions for additional submission requirements.

C. Number of submittals required:
   1. Shop Drawings: See Article 1.05 below.
   2. Product Data: See Article 1.05 below.
   3. Samples: Submit the number stated in the respective Sections.

D. Submittals shall contain:
   1. The date of submission and the dates of any previous submissions.
   2. The Project title and number.
   3. Contractor identification.
   4. The names of:
      a. Contractor
      b. Supplier
      c. Manufacturer
   5. Identification of the product, with the section number, page and paragraph(s).
   6. Field dimensions, clearly identified as such.
   7. Relation to adjacent or critical features of the work or materials.
   8. Applicable standards, such as ASTM or Federal Standards numbers.
   9. Identification of deviations from Contract Documents.
   10. Identification of revisions on resubmittals.
   11. A blank space suitably sized for Contractor and Engineer stamps as defined in the General Conditions.
   12. Where calculations are required to be submitted by the Contractor, the calculations shall have been checked by a qualified individual other than the preparer. The submitted calculations shall clearly show the names of the preparer and of the checker.

1.05 ELECTRONIC DATA SUBMITTAL FORMAT

A. Files shall be electronically searchable based on Owner and Engineer established standard file naming convention.

B. Quality and Legibility: Electronic submittal files shall be made from the original and shall be clear and legible. Do not provide scans of faxed copies. Electronic file shall be made at the full size of the original paper documents. All pages shall be properly oriented for reading on a computer screen without rotating.

C. Organization and Content:
   1. Each electronic submittal shall be one electronic file. Do not divide and submit individual submittals into multiple electronic files unless directed by Engineer.
   2. When submittal is large or contains multiple parts, provide PDF file with bookmark for each section of submittal.
   3. Submittal content shall include Contractor’s letter of transmittal and Contractor’s review and stamp.

D. Electronic file format:

E. PDF (Portable Document Format): .pdf, Adobe PDF documents; created through electronic conversion rather than optically scanned whenever possible.

1.06 REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The review of shop drawings, data and samples will be for general conformance with the design concept and Contract Documents. They shall not be construed:
   1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials.
3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

B. The Contractor remains responsible for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

C. If the shop drawings, data or samples as submitted describe variations and show a departure from the Contract requirements which Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or Contract Time, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes.
1. Code 1 - "APPROVED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.
2. Code 2 - "APPROVED AS NOTED". This code is assigned when a confirmation of the notations and comments IS NOT required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product.
3. Code 3 - "APPROVED AS NOTED/CONFIRM". This combination of codes is assigned when a confirmation of the notations and comments IS required by the Contractor. The Contractor may, at his own risk, release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation shall specifically address each omission and nonconforming item that was noted. Confirmation is to be received by the Engineer within 14 calendar days of the date of the Engineer's transmittal requiring the confirmation.
4. Code 4 - "APPROVED AS NOTED/RESUBMIT". This combination of codes is assigned when notations and comments are extensive enough to require a resubmittal of the package. This resubmittal is to address all comments, omissions and non-conforming items that were noted. Resubmittal is to be received by the Engineer within 14 calendar days of the date of the Engineer's transmittal requiring the resubmittal.
5. Code 5 - "NOT APPROVED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.
6. Code 6 - "COMMENTS ATTACHED" is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.
7. Code 7 - “SUBMITTED FOR THE RECORD” is assigned when the contractor has submitted information for record purposes.
8. Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor shall identify all revisions made to the submittals, either in writing on the letter of transmittal or on the shop drawings by use of revision triangles or other similar methods. The resubmittal shall clearly respond to each comment made by the Engineer on the previous submission. Additionally, the Contractor shall direct specific attention to any revisions made other than the corrections requested by the Engineer on previous submissions.

F. Partial submittals may not be reviewed. The Engineer will be the only judge as to the completeness of a submittal. Submittals not complete will be returned to the Contractor and will be considered "Not Approved" until resubmitted. The Engineer may at his option provide a list or mark the submittal directing the Contractor to the areas that are incomplete.

G. Repetitive Review
   1. Shop drawings and other submittals will be reviewed no more than three times at the Owner's and Engineer's expense. All subsequent reviews will be performed at times convenient to the Owner and Engineer and at the Contractor's expense, based on the Owner's and Engineer's then prevailing rates. The Contractor shall reimburse the Owner and Engineer for all such fees invoiced to the Owner by the Engineer as defined in Article GC-18 of the General Conditions. Submittals are required until approved.
   2. Any need for more than one resubmission, or any other delay in obtaining Engineer's review of submittals, will not entitle Contractor to extension of the Contract Time.

H. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor shall give written notice thereof to the Engineer at least 7 working days prior to release for manufacture. If such notice is not received within 7 day the Contractor will not be eligible for a claim against the County for additional compensation.

I. When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

1.07 DISTRIBUTION

A. Distribute reproductions of approved shop drawings and copies of approved product data and samples, where required, to the job site file and elsewhere as directed by the Engineer. Number of copies shall be as directed by the Engineer but shall not exceed six.

1.08 PROFESSIONAL ENGINEER (P.E.) CERTIFICATION FORM

A. If specifically required in other related Sections, submit a P.E. Certification for each item required, in the form attached to this Section, completely filled in and stamped.

1.09 ADDITIONAL SUBMITTAL REQUIREMENTS

A. Additional Contractor submission requirements are included in Article GC-14 of the General Conditions.

1.10 GENERAL PROCEDURES FOR SUBMITTALS

A. Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work of other related Sections, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SUBMITTAL REVIEW CERTIFICATION FORM

The undersigned hereby certifies that he/she is a Professional Engineer registered in the State of New York and that he/she has been employed by

_____
(Name of Contractor)

to design _____
(Insert P.E. Responsibilities)

in accordance with Section _____ for the

_____
(Name of Project)

The undersigned further certifies that he/she has performed the design of the

_____
(Name of Project)

that said design is in conformance with all applicable local, state and federal codes, rules, and regulations, and that his/her signature and P.E. stamp have been affixed to all calculations and drawings used in, and resulting from, the design.

The undersigned hereby agrees to make all original design drawings and calculations available to the Nassau County Department of Public Works

_____
(Insert Name of Owner)

or Owner's representative within seven days following written request therefor by the Owner.

_____	_____
P.E. Name	Contractor's Name
_____	_____
Signature	Signature
_____	_____
Address	Title
	_____
	Address

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section describes the requirements for safe and healthful working conditions.

1.02 RELATED SPECIFICATIONS

A. Section 013543, Environmental Procedures

1.03 PAYMENT

A. No separate payment for the item "Safe and Healthful Working Conditions" will be made. The costs of same will be included in the Base Bid.

1.04 DEFINITIONS

A. Safety staff shall mean the safety professional and his safety representative(s) or the safety person.

1.05 SPECIAL CONDITIONS

A. In prosecuting the work of this Contract, provide working conditions on each operation that shall be as safe and healthful as the nature of that operation permits. The various operations connected with the work shall be so conducted that they will not be unsafe or injurious to health; and the Contractor shall comply with all regulations and published recommendations of the New York State Department of Labor and all provisions, regulations and recommendations issued pursuant to the Federal Occupational Safety and Health Act of 1970 and the Construction Safety Act of 1969, as amended, and with laws, rules, and regulations of other authorities having jurisdiction, with regard to all matters relating to safe and healthful working conditions. Compliance with governmental requirements is mandated by law and considered only a minimum level of safety performance. Perform all work in accordance with safe work practice.

B. The Contractor shall be responsible for the safety of the Contractor's employees, the public and all other persons at or about the site of the work. The Contractor shall be solely responsible for the adequacy and safety of all construction methods, materials, equipment and the safe prosecution of the work.

C. Employ a properly qualified safety professional familiar with all work under this contract whose duties shall be to initiate, review and cause implementation of measures for the protection of health and prevention of accidents. Also employ full- time safety representative(s) whose sole duties shall be to work under the direct supervision of the safety professional, to implement the safety program for the work under this Contract.

D. The safety staff shall be provided with an appropriate office on the job site to maintain and keep available safety records, up-to-date copies of all pertinent safety rules, regulations and governing legislation, material safety data sheets, and the site safety plan including information concerning foreseeable emergency conditions, location of emergency and telephone contacts for supportive actions.

E. The Contractor shall stop work whenever a work procedure or a condition at a work site is deemed unsafe by the safety staff.

F. The Contractor and subcontractors shall be required to issue Photo Identification badges for each employee required to be on site. Badge shop drawings and updated logs showing employee names and badge numbers shall be issued to the Engineer for approval.

1.06 SUBMITTALS

A. Submit a Health and Safety Plan (HASP) as described in Section 013543, Environmental Procedures.

B. Within thirty (30) days of receiving a Notice to Proceed, the Contractor shall submit the name of a safety professional, employed by the Contractor, responsible for project safety management, and of the safety representative(s) who will work under his direction.

C. A resume, along with other qualifications, of the safety person or the safety professional and the safety representative(s), must be submitted to the Engineer for review and approval. The resume shall include such items as: experience, education, special safety courses completed, safety conferences attended and certification and registrations. Documentation and/or personal references confirming the qualifications may also be required. The persons proposed as safety person, safety professional or safety representative(s) may be rejected by the Engineer for failure to have adequate qualifications or other cause.

1.07 QUALIFICATIONS

A. Safety Professional: Recognition as a safety professional shall be based on a minimum of: Certification by the Board of Certified Safety Professionals as a Certified Safety Professional and five years of professional safety management experience in the types of construction and conditions expected to be encountered on the site.

B. Safety Representative: Qualifications of the safety representative(s) shall include a minimum of: five years of relevant construction experience, three years of which were exclusively in construction safety management, successful completion of a thirty (30) Hour OSHA Construction Safety and Health training course, 40 Hour OSHA Hazardous Materials training course, Confined Space training, and at least one year membership in the American Society of Safety Engineers.

C. Safety Person: Qualifications of the safety person must include a minimum of five years of relevant construction experience, two of which are related to safety management.

D. The safety staff shall be completely experienced with and knowledgeable of all applicable health and safety requirements of all governing laws, rules and regulations as well as of good safety practice. The safety staff shall not include the project manager, engineer, or superintendent, or anyone else working on the project. The safety staff shall have no other duties except those directly related to safety.

PART 2 – PRODUCTS

2.01 HEALTH AND SAFETY PLAN

A. The Contractor shall commit to writing a specific site health and safety plan before the start of any construction in accordance with Section 013543, Environmental Procedures.

2.02 ACCIDENT REPORTS

A. Promptly report to the Engineer all accidents involving injury to personnel or damage to equipment and structures, investigate these accidents and prepare required reports and submit a monthly summary of these accidents. The Contractor must submit a preliminary accident report to the Resident Engineer by the following day at the latest.

1. The summary report, due by the 10th day of the following month, shall include descriptions of corrective actions to reduce the probability of similar accidents.
2. In addition, the Contractor shall furnish to the Engineer a copy of all accident and health or safety hazard reports received from OSHA or any other government agency within one day of receipt.

B. In addition to the reports which the Contractor is required to file under the provision of the Worker's Compensation Law, he shall submit to the Engineer on or before the tenth day of each month a report giving the total force employed on his Contract in man-days during the previous calendar month, the number and character of all accidents resulting in loss of time or considered recordable by OSHA, and any other information on classification of employees, injuries received on the work, and disabilities arising therefrom that may be required by the Engineer.
   1. The submittal shall also contain an audit report for the prior month, including the safety training conducted, the above equipment logs, records of the condition of the work areas, safety and health records, OSHA and ANSI Z16.1 incidence rates for frequency and severity of recordable accidents, and an evaluation of the effectiveness of the HASP with any changes necessary.
   2. The safety professional (G) or safety person (E) and the Contractor shall sign this audit report. The Engineer will review these reports for Contractor's compliance with the safety provisions of the Contract.

2.03 SAFETY AND RESCUE EQUIPMENT

A. The Contractor shall have proper safety and rescue equipment, adequately maintained and readily available, for any foreseeable contingency. This equipment shall include such applicable items as: proper fire extinguishers, first aid supplies, safety ropes and harnesses, stretchers, water safety devices, oxygen breathing apparatus, resuscitators, gas detectors, oxygen deficiency indicators, combustible gas detectors, etc.

B. This equipment should be kept in protected areas and checked at scheduled intervals. A log shall be maintained indicating who checked the equipment, when it was checked, and that it was acceptable. This equipment log shall be updated monthly and be submitted with the monthly report. Equipment that requires calibration shall have copies of dated calibration certificates on site.

C. Substitute safety and rescue equipment must be provided while primary equipment is being serviced or calibrated.

2.04 PROTECTIVE EQUIPMENT

A. All personnel employed by the Contractor or his subcontractors or any visitors whenever entering the job site shall be required to wear appropriate personal protection equipment required for that area. The Contractor shall continuously provide all necessary personal protective equipment as requested by the Engineer for his designated representatives.

2.05 IDENTIFICATION BADGES

A. The Contractor shall submit shop drawings of Identification Badge to the Engineer for approval.

2.06 HOT WORK PERMIT

A. All hot work shall be in accordance with NFPA 51B.

B. The Contractor shall complete and submit the Nassau County Hot Work Permit included in this Section as Attachment 013529-A, located after the "End of Section" designation.

PART 3 – EXECUTION

3.01 SAFETY STAFF DUTIES

A. The safety professional shall visit and audit all work areas as frequently as necessary (a minimum of once a week) and shall be available for consultation whenever necessary. The safety staff shall have full authority to implement and enforce the health and safety plan to take immediate action to correct unsafe, hazardous or unhealthful conditions.

B. A member of the safety staff must be at the job site full time (a minimum of 8 hours per working day) whenever work is in progress. When multiple shift work is in progress more than one safety representative may be required.

C. The safety staff shall as a minimum:
   1. Schedule and conduct safety meetings and safety training programs as required by law, the safety plan, and good safety practice. A specific schedule of dates of these meetings and an outline of materials to be covered shall be provided with the safety plan. The Engineer shall be advised in advance of the time and place of such meetings. County personnel shall be invited to attend the meetings. All employees shall be instructed on the recognition of hazards, observance of precautions, of the contents of the safety plan and the use of protective and emergency equipment.
   2. Determine that operators of specific equipment are qualified by training and/or experience before they are allowed to operate such equipment.
   3. Develop and implement emergency response procedures. Post the name, address and hours of the nearest medical doctor, name and address of nearby clinics and hospitals, and the telephone numbers of the appropriate ambulance service, fire, and the police department.
   4. Post all appropriate notices regarding safety and health regulations at locations, which afford maximum exposure to all personnel at the job site.
   5. Post appropriate instructions and warning signs in regard to all hazardous areas or conditions, which cannot be eliminated. Identification of these areas shall be based on experience, on site surveillance, and severity of hazard. Such signs shall not be used in place of appropriate workplace controls.
   6. Ascertain by personal inspection that all safety rules and regulations are enforced. Make inspections at least once a shift to ensure that all machines, tools and equipment are in a safe operating condition; and that all work areas are free of hazards. Take necessary and timely corrective actions to eliminate all unsafe acts and/or conditions, and submit to the Engineer each day a copy of his findings on the inspection check list report forms established in the safety plan.
   7. Submit to the Engineer, copies of all safety inspection reports and citations from regulating agencies and insurance companies within one working day of receipt of such reports.
   8. Provide safety training and orientation to authorized visitors to ensure their safety while occupying the job site.
   9. Perform all related tasks necessary to achieve the highest degree of safety that the nature of the work permits.

3.02 VISITORS

A. All non-County personnel visitors that visit and tour the site shall sign the Visitors Log at the Plant's Administration Building, and sign waivers as directed by the County. The Resident Engineer must be aware of all tours/visits in conjunction with the Safety Evacuation Plan Protocol notification. All efforts should be made not to schedule site tours/visits at the time of scheduled evacuation drills.

3.03 ATTACHMENTS

A. The attachments listed below, following the "End of Section" designation, are a part of this Specification section.
   1. Attachment 013529-A, Hot Work Permit.

END OF SECTION

Nassau County Department of Public Works
Hot Work Permit

Hot Work Permit Job Information

Contractor Name: _____Location of Hot Work: _____
Permit Authorizing Individual: _____Phone: _____
Permit Issued (Date) _____ (Time) _____ AM/PM
Permit Expires (Date) _____ (Time) _____AM/PM

Type of hot work to be used (Source of ignition): ❑ Grinding ❑ Cutting ❑ Brazing or Soldering
❑ Welding/Burning ❑ Heating ❑ Other_____

PPE to be Used by Person Performing Hot Work: _____
_____
Describe the Hot Work Job and Materials to be Worked on: _____
_____
Any special hazards and/or special precautions to be taken: _____
_____
_____

Fire Watch Required? ☐ **Yes** ☐ **No** **Number of Fire Watches Required: ____**

Acknowledgement of Permit Review by Person Performing Work or Crew Supervisor

Acknowledgment: I participated in the work site preparation, coordinated with the PAI, reviewed this Hot Work Permit and I fully understand the work to be performed and my responsibilities. The person(s) performing the hot work understand that this permit is valid only so long as work conditions existing at the time of issuance do not change. They will stop the work and notify the PAI of any change in work area conditions which adversely affects safety. I or the person(s) performing the work are adequately trained in the safe handling and use of their equipment and applicable regulatory requirements.

Worker/Supervisor: _____Signature: _____
Company: _____Date: _____

Permit Authorizing Individual (PAI) Authorization

I completed the site inspection, notified the person performing the work or their crew supervisor about flammable materials or hazardous conditions which may not be obvious, and verified that the person performing (or directly supervising the crew performing) hot work has reviewed the permit and signed the acknowledgment above. (If no, hot work is not permitted)

Signature: _____ Date: _____

Notice: Post this permit in Hot Work Permit area until permitted operations are complete. Upon Completion return permit to the PAI.

Final Inspection (Fire Watch, or PAI if No Fire Watch Was Required)

I completed final inspection at the required times after completion of Hot Work and observed no signs of smoldering or combustion.

Signature: _____ Date: _____ Time: _____ (Day 1)

Day		Date/Time	Acceptable	Final	Comments

	PAI Signature		Yes	No	Insp./ Initials	
2						
3						
4						
5						
6						
7						

- Permit Authorizing Individual (PAI) - The individual designated by management to authorize hot work
- Conducts inspection to verify that safeguards are in place based on site-specific conditions of flammable/ combustible materials, hazardous processes, or other potential fire hazards in the work location.
- Ensure fire protection and extinguishing equipment are available and properly located at the site.
- Verify a fire watch is at the site, if required.
- Issues a Hot Work Permit (HWP), when required.

Hot Work Required Precautions Checklist

1) Inspect work area and confirm that applicable precautions have been taken in accordance with NFPA 51B (by PAI After Coordination With & Setup By Person Performing Hot Work; initially and when revalidating):
2) All sprinkler and/or other fire suppression systems in the Hot Work Permit area operational.
3) Cutting/welding equipment in good repair, free of damage or defects.
4) Persons conducting hot work have been trained.
5) All facility employees or other parties that may be potentially affected by the hot work have been notified.

REQUIREMENTS WITHIN 35 FEET OF WORK (HORIZONTAL & VERTICAL)

1) Flammable liquids and combustible dust/lint/oil deposits/trash removed or shielded with fire-retardant material.
2) Flammable vapor sources removed or flammable vapor properly tested and found to be well below the LEL.
3) Combustible flooring properly wetted, wet sanded or shielded.
4) Combustible walls, ceilings, partitions or roofing properly shielded.
5) Covers under work to keep sparks from lower levels and shielding/partitions to protect passer-by.

WORK ON WALLS OR CEILINGS

1) Combustibles have been moved away from opposite side. (If no, hot work is not permitted)
2) No combustible covering, interior (for sandwich-type panel) or other combustible content.
3) Danger from conduction of heat to adjacent rooms eliminated.

WORK ON ENCLOSED EQUIPMENT (Tanks, Containers, Ducts, Dust Collectors, etc.)

1) All duct and conveyor systems properly protected or shut down.
2) Equipment is cleaned of all combustibles, flammable vapors, liquids, or dusts. (If a flammable vapor source, conduct vapor monitoring)

FIRE WATCH

1) Required for the following: (a) Torch work (b) Combustibles within 35' (c) Combustibles >35', but easily ignited, (d) Wall/floor openings expose adjacent/concealed combustibles, (e) Conduction through metal can ignite other side (f) Potential for more than a minor fire.
2) Charged, inspected, operational fire extinguishers of an appropriate type are present.
3) Fire Watch trained in extinguisher and emergency alarms (fire alarm, telephone, or radio).

OTHER PRECAUTIONS

1) Work in a confined space requires Confined Space Entry Permit prior to hot work permit approval.
2) Is continuous atmospheric monitoring, smoke detection or heat detection warranted?
3) Ample ventilation exists or provisions made for continuous ventilation to remove smoke/vapor from work area
4) Process equipment/piping purged, disconnected and blanked in accordance with Lockout/Tagout procedures.
5) Do conditions require Re-Validation more than every 24 hours?

SECTION 013543 – ENVIRONMENTAL PROCEDURES

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope
   1. This section describes the minimum health, safety, and emergency response requirements for the activities at the site. Site activities may involve worker exposure to potentially hazardous materials.
   2. Contractor shall implement health and safety criteria and practices sufficient to protect onsite personnel, the public, and the environment from physical and chemical hazards particular to each site.
   3. The Contractor shall furnish all labor, materials, equipment, and incidentals to remediate any hazardous materials discovered during the performance of the work in this Contract.

B. References: Where conflicts arise between requirements of the regulatory requirements listed below, the most restrictive of the requirements shall be followed.
   1. 29 CFR 1910 OSHA Standards; General Industry
   2. 29 CFR 1910.120 OSHA Standards; Hazardous Waste Operations and Emergency Response
   3. 29 CFR 1926 OSHA Standards; Construction Industry
   4. DOT Standards and Regulations 49 CFR 171 Hazardous Materials Regulations; General Information, Regulations, and Definitions
   5. DOT Standards and Regulations 49 CFR 172 Hazardous Materials Tables and Military Standards
   6. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, ACGLH
   7. Guide to Occupational Exposure Values, ACGIH

C. Related Specifications
   1. Section 013529, Safe and Healthful Working Conditions.

1.02 REMEDIAL ACTION FOR UNFORESEEN HAZARDOUS MATERIAL

A. When remedial action is necessary for unforeseen hazardous materials, the Engineer will submit the scope of work in writing to the Contractor. The Contractor shall then obtain proposals for the work, including prices, from three separate County approved certified hazardous material remediation specialists, and submit them in writing to the Engineer within ten (10) consecutive calendar days of receiving the scope of work. The Engineer may select one proposal and direct the Contractor to engage the selected remediation specialist as a Subcontractor. Remediation work shall not commence until the Contractor receives written notice from the Engineer to proceed with the work. All remediation work shall be performed by the certified remediation specialist.

B. Some of the remediation work may be critical to maintaining construction schedules. When this occurs, a time of completion shall be indicated in the scope of work submitted to the Contractor by the Engineer, and the work shall be subject to liquidated damages as set forth in the Agreement, Article XIV, "Liquidated Damages."

C. Disposal of wastes generated by remediation work will be based on the results of the testing performed by the Contractor. Disposal of remediated hazardous material must be at a site approved by the County and applicable state agency to accept such waste. The Contractor shall notify the Engineer at least fourteen (14) days prior to removal of the containers of hazardous material to allow for inspection of the containers and the hazardous waste manifest.

D. The Contractor shall submit written evidence that the receiving waste treatment, storage, or disposal facility to receive such waste by the EPA, DEC and State or local regulatory agencies. The Contractor shall also submit copies of the complete manifest, signed, and dated by the initial transporter, in accordance with Federal and State requirements. Completed and signed manifests from treatment or disposal facility shall be provided to the County within seven (7) days of disposal.

PART 2 – PRODUCTS

2.01 HEALTH AND SAFETY PLAN

A. The Contractor shall have a Health and Safety Plan (HASP) prepared, prior to the start of any construction. The HASP shall be available to workers on site and be submitted to the Engineer and County at least two weeks before the beginning of any field work. Copies of the plan shall be provided to the Contractors' insurers and their risk managers, if any, by the Contractor.
   1. The Contractor will abide by the work specific Health and Safety requirements as directed by the County.
   2. The provisions of the site HASP in no way relieves the Contractor of his primary obligation to provide for the safety of his employees and to ensure that all operations under this Contract are carried out so as to protect persons and property on the site and in the surrounding work area.

B. These minimum health and safety requirements are based on the potential for physical, biological, and chemical hazards associated with the work activities, including the potential exposure to hazardous materials that may be present. The HASP shall be prepared by a Certified Industrial Hygienist (CIH) who is qualified by training and experienced to perform this work. The HASP shall be submitted to the Engineer and County for review. The purpose of the HASP is to establish site-specific health and safety requirements for protecting the health and safety of the Contractor and subcontractor personnel and visitors during all activities conducted on-site.
   1. Construction activities which need to be addressed in the HASP include, but are not limited to:
      a. Soil excavation and grading.
      b. Demolition.
      c. Equipment installation.
   2. The HASP shall include as a minimum the following items tabulated in Paragraph 2.1.E through Paragraph 2.1.S, below.

C. The Contractor shall identify an individual who shall serve as the Site Safety Officer for this project. The individual shall:
   1. Have a working knowledge of pertinent federal, state, and local health and safety regulations, program development and implementation, and air monitoring techniques.
   2. Be knowledgeable in tank cleaning procedures and protocols required by this project.
   3. Be certified as having completed training in first aid and CPR by a recognized, approved organization, such as the American Red Cross.
   4. Be continuously onsite during all operations covered by this Contract.
   5. Be familiar with the Site Health and Safety Plan and its requirements and be responsible for the Plan's implementation.
   6. The Site Safety Officer may designate an alternate to assist him, provided his alternate meets all of the above requirements. The Contractor shall submit the name, qualifications (education summary and documentation), and work experience of the Site Safety Officer, and any alternates to the Engineer prior to commencement of work at the site.

D. Personnel Qualifications (CIH): The Contractor shall identify an individual who shall serve as the CIH for this project. This individual shall:
   1. Have a minimum of three (3) years’ experience in tank removal or hazardous waste field.

2. Be familiar with all applicable OSHA, USEPA, and NYSDEC standards.

E. Standards and Regulations: The HASP shall be developed in accordance with the Occupational Safety and Health Administration (OSHA) Standards and Regulations contained in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) and all pertinent laws, rules, and regulations existing at the time of the work, including, but not limited to:
   1. Hazardous Waste Management System, Title 40 CFR 261-264.
   2. OSHA Standards, Hazardous Waste Operations and Emergency Response, Title 29 CFR 1910.120.
   3. OSHA Standards, Asbestos Regulations, Title 29 1910.1001.
   4. OSHA Standards, Subpart Z, Toxic and Hazardous Substance, Title 29 CFR 1926.58.
   5. OSHA Standards, Title X, Lead in Construction, 1926.62.
   6. EPA National Emission Standard for Hazardous Air Pollutants, National Emission Standard for Asbestos, Title 40 CFR, Part 51, Subpart M.
   7. OSHA Standards, Hazard Communication, Title 29 CFR 1926.59.
   8. OSHA Standards, Access to Employee Exposure and Medical Records, Title 29 CFR 1910.20.
   9. OSHA Standards, Personal Protective Equipment, Title 29 CFR 1910.133.
   10. OSHA Standards, Record Keeping, Title 29 CFR 1910.20.
   11. OSHA Standards, Respiratory Protection, Title 29 CFR 1910.134.
   12. The American National Standard Institute (ANSI) Practices for Respiratory Protection, ANSI Z38.2.
   13. OSHA Standards, Ventilation, Title 29 CFR 1910.94.
   14. ANSI Fundamentals Governing the Design and Operation of Local Exhaust System, ANSI Z9 2.
   15. Hazardous Waste Management System, Title 6 NYCRR Parts 370-373.
   16. Asbestos Safety Program Requirements, NYCRR Chapter 11, Title 10, Part 73.
   17. Industrial Code Rule 56, NYCRR Title 12, Part 56.
   18. Transportation Act, Title 49 CFR Parts 106, 107, 171-179.
   19. New York State Solid Waste Hauling and Disposal Regulations, NYCRR Title 6, Parts 360 and 364.

F. Identification of Key Health and Safety Personnel and Alternates:
   1. List key personnel and alternates for site health and safety on a project responsibility chart, which includes phone numbers.
   2. Identify roles and responsibilities of key personnel.

G. Project Task/Operation Health and Safety Risk Analysis:
   1. Identify and describe the project tasks.
   2. Provide a hazard assessment of each project task, which shall include descriptions of potential chemical, biological, and physical hazards associated with the performance of the activity.
   3. Provide a description of health and safety mitigative actions for each project task which shall include, but not be limited to, administrative control, engineering control, safe work practice controls and personal protective equipment.

H. Personnel Training Requirements:
   1. Confirm that personnel are adequately trained to conduct their job responsibilities and handle the specific hazardous situations they may encounter during the project.
   2. Provide, as required, certification of personnel training and First Aid/Cardio-Pulmonary Resuscitation (CPR).
   3. Establish procedures and training for Hazard Communication Program in accordance with 29 CFR 1910.1200.
   4. Provide information regarding training and experience of the person who will oversee excavation activities.

I. Personnel Protective Equipment (PPE) and PPE Reassessment Program:
   1. Describe the protective clothing and equipment to be worn by personnel during task-specific operations of the project.
   2. Describe the PPE reassessment program for the upgrading/downgrading of PPE levels associated with the task-specific operations of the project.
   3. Provide a written respiratory protection program and reassessment program, which shall be implemented during task-specific operations. The written program must include the procedure for proper section and use of respirators, instructions on proper cleaning, storage, and inspection of respirators.

J. Medical Surveillance:
   1. Describe the program for medical monitoring for each task-specific activity.
   2. Confirm and provide documentation, as applicable, that all project personnel are currently under a medical surveillance program.
   3. Provide documentation, as applicable, that all project personnel have respiratory clearance.

K. Site Control Measures:
   1. Define site control methods and site communications and include a site map delineating the control areas, if appropriate.
   2. Delineate the work area, including an exclusion zone (EZ), contamination reduction zone (CRZ) and the support zone, and describe the activities allowed in each zone.

L. Engineering Control Measures:
   1. Identify methods to control the generation of airborne particulates and volatile organic vapors during excavation of potentially contaminated soils.
   2. Identify engineering control of generation of lead-containing airborne particulates when impacting materials coated with lead paint.
   3. Identify engineering controls (e.g., tent enclosure, wetting of surfaces) to control generation of dusts when conducting dust-generating activities indoors (e.g., demolition of concrete foundations).

M. Decontamination Program:
   1. Establish decontamination procedures for personnel and equipment.
   2. The decontamination plan shall include provisions for hand wash facilities, and lunch/break areas, and a description of proper housekeeping practices.

N. Air Monitoring Program:
   1. Describe the area air monitoring program to be conducted during all intrusive site work, soil handling, and below-grade equipment installation, when works may be exposed to potentially contaminated soils. Minimum air monitoring requirements must include continuous real time measurements for volatile organic vapors, hydrogen sulfide, dust, and LEL (methane).
   2. Describe the area air monitoring program to be conducted during equipment removal and demolition affecting materials coated with lead paint when airborne dusts may be generated.
   3. The air monitoring programs shall identify the analytical methodology required for each task-specific activity to ensure regulatory compliance.

O. Emergency Response/Contingency Plan:
   1. Describe instruction and procedures for evacuation of personnel.
   2. Describe instructions and procedures for methods of reporting fires. If the Contractor will be conducting activities such as welding, hot cutting or burning, or working with flammable materials such as paints, glues, and solvents, the Contractor shall provide a minimum of two Class ABC fire extinguishers (minimum 10 pounds) in the work area. The Contractor

shall obtain a "Hot Works Permit" from the agency having authority and submit copies to the Engineer.

3. Describe instructions and procedures for medical emergencies, including emergency notification and response procedures and a description of the route to the hospital.
4. The medical emergency contingency plan shall include provisions for a minimum of two first aid kits (minimum 24-unit industrial first aid kit).
5. Describe procedures addressing emergencies and equipment failures and barrier failures during work activities.

P. Surveillance Methods:
   1. Describe safety surveillance methods.
   2. Provide schedules of both walk-through surveys and in-depth safety audits to be performed on site.

Q. Safety Inspection Sheets:
   1. Provide safety inspection check-off sheets to be used on a regular basis in evaluation the site work and methods.

R. Safety Evacuation Drill: A quarterly evacuation drill shall be held in coordination with the existing plan alarm signal under the control of the Plant Chief. Conducting the safety drill shall be coordinated during regular scheduled work hours but timed to minimize disruption of major contract work. Upon evacuation, the Contractor shall immediately notify the Plant Chief and/or Resident Engineer that all personnel have evacuated.

S. Accident Prevention: An Accident Prevention Plan and description of work-phase safety plan shall be developed and written by a CIH. Each phase of the Accident Prevention Plan shall include a description of the work activity, probable hazards related to the work, and positive precautionary measures to be taken to safeguard against and reduce or eliminate each hazard. In the event of an accident/injury, the Contractor shall immediately notify the Engineer. Within two working days of any reportable accident, the Contractor shall complete and submit to the Engineer an Accident Report.

T. The Unforeseen Hazardous Material Remediation allowance provided in Section 01020, Allowances is intended to cover only those extra costs incurred by the Contractor in meeting County directed health and safety or remedial action requirements. It is not intended to fund the Contractor for the hiring of his own consultants nor to fund the costs of the Contractor's meeting obligations under OSHA.

PART 3 – EXECUTION

3.01 HAZARDOUS MATERIALS

A. There may be materials present at the project site that may pose chemical hazards to site workers during construction activities.

B. The Contractor shall be responsible for identifying suspect hazardous materials as they are encountered. Indication of the presence of hazardous materials, including odorous or stained soils and liquids, shall be immediately reported to the Engineer. If it is determined that the presence of hazardous material is not a threat to the health and safety of County to Contractor personnel, the Contractor shall continue planned work activities. Otherwise, the Contractor will be directed to take additional health and safety precautions as appropriate.

C. All non-disposable equipment that has been in contact with contaminated soils, lead-containing debris, or other hazardous materials, shall be cleaned prior to leaving the site. Equipment decontamination shall be performed in an area to be directed by the Engineer. The Contractor

shall be responsible for containing all procedures within the perimeter of the designated decontamination area.

1. The solid materials and rinse water collected as the result of the decontamination procedures shall be stored in appropriate containers on-site prior to disposal. Disposal of the wastes will be based on the results for testing performed by the Contractor and will be classified as non-hazardous or hazardous waste.
2. Rinse water that does not meet the criteria for discharge to a POTW, shall be disposed of at an appropriate treatment and/or disposal facility.
3. "Payment for disposal of the decontamination wastes shall be made from the Hazardous Materials Remediation Allowance item as described in Section 01020, Allowances.

3.02 MEDICAL SURVEILLANCE

A. Physical examinations for personnel working onsite shall be provided prior to project start-up. The examinations shall address the chemical and physical hazards to which the employees will be exposed. The medical examination results shall be evaluated by a physician practicing occupational medicine to determine that the individual is medically qualified to wear a respirator and is physically fit for the work to be performed. The physician must certify that no physical condition or disease could be aggravated by exposure to the identified hazards. The results of the medical surveillance program shall be provided to the Engineer upon request.

3.03 PERSONNEL TRAINING

A. Personnel employed to sample tank residuals, perform hazardous materials remediation, and supervisors shall be trained and thoroughly familiar with the safety precautions, procedures, and equipment required for controlling the potential hazards associated with this project. This training shall be documented in detail and recorded in the project's records.

3.04 FIRST AID AND EMERGENCY RESPONSE EQUIPMENT AND PROCEDURES

A. The Contractor shall provide for appropriate emergency first aid equipment (including ANSI-approved eye wash stations, a portable stretcher, and an industrial-type first aid kit) suitable for treatment of exposure to site physical and chemical hazards. Additionally, two ABC-rated fire extinguishers shall be maintained on site as well absorbent material of sufficient quantity to as collect any spill which might occur during this project. A listing of emergency phone numbers and of contact for fire, hospital, police, ambulance, and other necessary contacts shall be points posted the Contractor's site. A route map detailing the directions to the nearest hospital also shall be posted.

3.05 HEAT AND COLD STRESS

A. The Contractor shall monitor all personnel for signs of heat or cold stress, as dictated by weather conditions. In addition, all field personnel shall be instructed to observe for symptoms of heat or cold stress in themselves and fellow workers and methods to control them. The Contractor shall adhere to guidelines provided in the Threshold Limit Values and Biological Exposure Indices published by the ACGIH for heat and cold extremes.

3.06 ILLUMINATION

A. Work areas shall be illuminated to a minimum of 10 foot-candles. Lighting shall be sufficient to determine whether material spills have occurred.

3.07 ELECTRICAL SAFETY

A. All electrical services must be grounded and equipped with and use ground fault circuit interrupter (GFCI) protected outlets. Portable lights used outside the Final Sedimentation Tanks shall be

suitable for hazardous locations and shall be connected to extension cords equipped with connectors or switches approved for hazardous locations. Such equipment, when used, shall be inspected to ensure it will not be a source of ignition. All air monitoring instrumentation shall be rated as intrinsically safe for Class I, Division I, Group D atmospheres.

3.08 SITE CONTROL AND WORK ZONES

A. Personnel not directly involved with this project shall not be permitted to enter the work zone. For purposes of this Contract, the "Work zone" and Contractor's staging areas shall be the areas as shown on the drawings. The initial minimum level of PPE shall be in accordance with these Specifications. The boundary of the work zone shall be demarcated and posted clearly by the Contractor.

3.09 COMBUSTIBLE GAS/OXYGEN MONITORING

A. All tanks shall be monitored for the presence of combustible vapors prior to the start of project operations. Such monitoring shall be conducted both in the tanks and in the areas surrounding the tanks, especially in excavations.

B. If combustible gas monitoring shows that explosive levels within the tanks are less than 10% Lower Explosive Limit (LEL), those tanks may be removed and purged on the surface. However, if readings are at or above 10% LEL, the tank shall be monitored and purged in the ground, as outlined elsewhere in these Specifications.

C. Purging shall continue until monitoring shows readings below 10% LEL. Any reading above 10% LEL outside the tanks shall result in the suspension of operations until the situation is resolved, and retesting indicates the space is "safe" (explosive levels less than 10% LEL).

D. Also, oxygen levels shall be monitored in trenches and excavations prior to allowing workers to enter, and continuously during the time the workers are present in these spaces. Any reading less than 19.5% or greater than 23% oxygen shall prevent the workers from entering until the situation is resolved and retesting indicates the space is safe for entry.

E. Resolution of these hazardous situations may require forced ventilation of the space. Any combustible gas/oxygen monitor, provided it complies with these Specifications, may be selected.

F. The combustible gas indicator shall be calibrated, checked, and maintained daily as per manufacturer's directions.

3.10 AIR MONITORING AND SURVEILLANCE

A. When personnel are working on or near tanks or within trenches/excavations, the Contractor shall implement routine air surveillance and monitoring for LEL and oxygen levels. Air monitoring and surveillance shall be required whenever personnel enter a trench/excavation, every fifteen (15) minutes during tank decontamination, or whenever site conditions indicate that fuel vapors are present. Air monitoring, when conducted, shall be performed in the breathing zone of the personnel. Air monitoring and surveillance equipment shall be described in the Health and Safety Plan.

3.11 ACTION LEVELS

A. Based upon published results of air monitoring and surveillance for combustible gas/oxygen monitoring for similar projects, the following action levels are recommended.
   1. Combustible Gas Monitoring
      a. 0 to 10% LEL: Normal operations, continue monitoring

b. Greater than 10% LEL: Shut down operations and equipment; ventilate area

2. Oxygen Monitoring
   a. 19.5% to 23% Oxygen: Normal operations, continue monitoring
   b. Less than 19.5% oxygen: Shut down operations and ventilate area
   c. Greater than 23% oxygen: Shutdown operations and ventilate area

3.12 EXCAVATION SAFETY

A. All demolition and excavating work shall be conducted in strict conformance with, at a minimum, 29 CFR 1926.650 through 29 CFR 1926.653, including requirements for sloping or shoring found in 29 CFR 1926.652. If the excavation must remain open during periods when the work site is unoccupied (i.e., overnight, over a weekend, and other similar off periods) barricades shall be placed around the excavation in such a manner to alert personnel to the danger and prevent them from falling into the trench (i.e. using road plates and barriers.)

3.13 CONFINED SPACE ENTRY

A. If any person is required to enter the tank or an excavation greater than 4 feet, it is considered a confined space entry. The medical surveillance shall ensure that the worker can enter a confined space. Workers required to enter confined space shall have the specialized training required under CFR 1910. 146 (Vol. 58, No. 9, January 14, 1993).

3.14 EATING, DRINKING, SMOKING

A. No eating, drinking, smoking, chewing of tobacco or gum, or other hand-to-mouth activities shall be permitted in any of the work areas during this project.

3.15 IGNITION SOURCES

A. Ignition sources (e.g., cigarette lighters, matches, or other flame producing items) not required for the completion of the project, shall not be permitted in the work zones. Before any work is done that might release vapors, work areas shall be barricaded and posted, and burning or other work shall be eliminated from the area where flammable vapors may be present or may travel. No work shall be done if the direction of the wind might carry vapors into areas where they might produce a hazardous condition, or when an electrical storm is threatening the site of work. Sparks caused by friction of electrostatic effects also may be a source of ignition in flammable atmospheres, especially at low humidity. Proper grounding of metal objects and/or electrical equipment, together with the use of sparkless tools and localized adjustment of humidity, may reduce this hazard.

3.16 BREAK AREA AND SUPPORT ACTIVITIES

A. All eating, drinking, smoking, and break facilities, as well as the Contractor's equipment storage, parking, and office shall be located outside the work zones as determined by the Site Safety Officer and approved by the Engineer.

3.17 SANITATION

A. The Contractor shall ensure that all onsite personnel have ready access to soap and clean water for washing and portable toilet facilities. The treatment plant washroom facilities usage is not permissible to the Contractor and crew.

3.18 UNFORSEEN HAZARDS

A. Should any unforeseen or site-specific safety-related threat, hazard, or condition become evident during the performance of work at this site, it shall be the Contractor's responsibility to bring such

conditions to the attention of the Engineer both verbally and in writing as quickly as possible, for resolution. In the interim, the Contractor shall take prudent action to establish and maintain working conditions and to safeguard employees, the public, and the environment.

3.19 TERMINATION

A. Any disregard for the provisions of these Specifications shall be deemed just and sufficient cause for termination of the Contractor or any Subcontractor without compromise or prejudice to the rights of the Contractor.

END OF SECTION

SECTION 014219 – REFERENCE STANDARDS

PART 1 – GENERAL

1.01 GENERAL

A. When a reference standard is specified, comply with the requirements and recommendations stated in that standard, except when they are modified by the Contract Documents, or when applicable laws, ordinances, rules, regulations or codes establish stricter standards. The latest provisions of applicable standards shall apply to the Work, unless otherwise specified. Reference standards include, but are not necessarily limited to, the following:
   1. AMCA- Air Moving and Conditioning Association, Inc.
   2. AASHTO - American Association of State Highway and Transportation Officials.
   3. ABMA- American Boiler Manufacturers' Association
   4. ACI - American Concrete Institute.
   5. ACIFS- American Cast Iron Flange Standards.
   6. AFBMA- Anti-Friction Bearing Manufacturers Association.
   7. AGA- American Gas Association.
   8. AGMA- American Gear Manufacturers Association.
   9. AIA- American Institute of Architects.
   10. AISC- American Institute of Steel Construction.
   11. AISI- American Iron and Steel Institute.
   12. ANSI - American National Standards Institute.
   13. APA- American Plywood Association.
   14. API- American Petroleum Institute.
   15. ASCE- American Society of Civil Engineers.
   16. ASME- American Society of Mechanical Engineers.
   17. ASTM- American Society for Testing and Materials.
   18. AWPA- American Wood Preservers Association.
   19. AWS- American Welding Society.
   20. AWWA- American Water Works Association.
   21. CGA- Compressed Gas Association.
   22. CRSI- Concrete Reinforcing Steel Institute.
   23. CMAA- Crane Manufacturers' Association of America.
   24. DIPRA- Ductile Iron Pipe Research Association.
   25. EEI- Edison Electric Institute.
   26. EJMA- Expansion Joint Manufacturers' Association.
   27. Fed Spec - Federal Specifications.
   28. FM- Factory Mutual.
   29. HMI- Hoist Manufacturers' Institute.
   30. IEEE- Institute of Electrical and Electronic Engineers.
   31. IPCEA- Insulated Power Cable Engineers Association.
   32. NACE- National Association of Corrosion Engineers.
   33. NB- National Board of Boiler Pressure Vessels.
   34. NBS- National Bureau of Standards.
   35. NEC- National Electric Code.
   36. NEMA- National Electrical Manufacturers Association.
   37. NFPA- National Fire Protection Association.
   38. NYSDOT - New York State Department of Transportation.
   39. OSHA- Occupational Safety and Health Act.
   40. PCA- Portland Cement Association.
   41. PCI- Pre-stressed Concrete Institute.
   42. RMA- Rubber Manufacturers' Association.
   43. SMACCNA - Sheet Metal and Air Conditioning Contractors National Association.
   44. SPI- Society of Plastics Industry.

45. SSPC- Steel Structures Painting Council.
46. STI- Steel Tank Institute
47. UL- Underwriters' Laboratory.

B. The Contractor shall, when required, furnish evidence satisfactory to the Engineer that materials and methods are in accordance with such standards where so specified.

C. In the event any questions arise as to the application of these standards or codes, copies shall be supplied on Site by Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Contractor shall provide all labor, materials, tools, equipment, and incidentals as shown, specified, and required to cooperate with the Coordinating Special Inspector and individual special inspectors employed by County, and to perform required testing and inspections. County shall engage the services of testing agencies as needed to facilitate Special Inspections.

B. Supplement A, Statement of Special Inspections, included with this Section, lists testing and inspection divisions. The Statement of Special Inspections has been prepared by the Structural Engineer of Record (SER) for the project.

1.02 DEFINITIONS

A. Special Inspector: Professional engineer or architect, hired by County, registered in the same state as the Site, responsible for coordinating and verifying the inspection and testing required by the Statement of Special Inspections included in this Section and reporting to the Building Official.

B. Building Official: Officer or other designated authority having jurisdiction charged with the administration and enforcement of the governing code, or a duly authorized representative.

C. SER: The Structural Engineer of Record (SER) is the Registered Design Professional in Responsible Charge of the structural system. The SER is responsible for preparing the Statement of Special Inspections (SSI) for the structural elements subject to inspection and testing.

D. Special Inspections: Testing and inspection required in the Statement of Special Inspections, prepared by the SER.

1.03 QUALITY ASSURANCE

A. County will employ and pay for services of the Special Inspector, who will have a minimum of five years of experience in managing, monitoring, and inspecting building construction.

B. Special Inspections shall be in accordance with applicable building code Laws and Regulations, and the Statement of Special Inspections, prepared by the SER.

C. Inspectors shall be qualified in their assigned Special Inspection in accordance with the Statement of Special Inspections, prepared by the SER.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:
   1. Samples: Representative Samples of materials when required or requested by County / Special Inspector.

B. Informational Submittals: Submit the following:
   1. Completed Supplement D, Fabricator's Certificate of Compliance, as attached to this Section, for fabrication of structural steel.
   2. Site Quality Control Submittals: Material test reports.
   3. Qualification Statements: Names and qualifications of each testing agency employed, and qualifications of testing agency's personnel that will perform testing as required in the Statement of Special Inspections, prepared by the SER.

1.05 Contractor's RESPONSIBILITIES

A. Provide safe access to Work to be tested and inspected.

B. Protect test samples left at designated area on Site.

C. Facilitate inspections and tests.

D. Provide access to Suppliers' and Subcontractors' operations as required.

E. Notify testing agencies, Special Inspector, and County sufficiently in advance of the Work for the testing agencies, Special Inspector, and County to coordinate their personnel at the Site. Do not cover Work to be inspected until Special Inspections have been completed and accepted.

F. Special Inspections required in this Section do not supersede or make unnecessary inspections and tests required under other Specification Sections or standard inspections required by Laws and Regulations.

G. Provide the completed Statement of Special Inspections to the local Building Official when obtaining the Building Permit.

1.06 SPECIAL INSPECTOR's RESPONSIBILITIES

A. Special Inspector will:
   1. Review testing agencies and testing personnel, relative to conformance to the Statement of Special Inspections, and in accordance with Laws and Regulations.
   2. Complete Supplement A, Statement of Special Inspections, of this Section to provide names of each inspector and testing agency for each Special Inspection required. Review completed Statement of Special Inspections, prepared by SER for general conformance with the current State Building Code.
   3. Coordinate activities of individual inspectors and testing agencies with Contractor.
   4. Provide interim reports of inspections and material testing to Building Official, County.
   5. To obtain certificate of use and occupancy from the Building Official, complete and provide to the Building Official, County, Supplement B, Final Report of Special Inspections, of this Section, documenting completion of Special Inspections and correction of discrepancies noted in the Special Inspections.

1.07 INSPECTOR RESPONSIBILITIES

A. Perform specified inspections, sampling, and testing of materials and methods of construction; review and ascertain compliance with Laws and Regulations.

B. Promptly notify Special Inspector, County, and Contractor of irregularities or deficiencies in the Work observed during Special Inspections. Corrective action, if required, will be determined by County.

C. Promptly submit two copies each of reports of inspections and tests to Special Inspector, County, and Contractor including:
   1. Date issued.
   2. Project title and number.
   3. Name and signature of inspector.
   4. Date of inspection or sampling and test.
   5. Record of temperature and weather.
   6. Identification of product and Specification Section.
   7. Location in Project.
   8. Type of inspection or test.

9. Location of inspection or test within project.
10. Results of inspections and tests, and observations regarding compliance with Laws and Regulations, and standards.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 SUPPLEMENTS

A. The supplements listed below, following the "End of Section" designation, are part of this Section:
   1. Supplement A – Statement of Special Inspections
   2. Supplement B – Final Report of Special Inspections
   3. Supplement C – (Not Used)
   4. Supplement D – Fabricator's Certificate of Compliance

END OF SECTION

Supplement A - Statement of Special Inspections

Project:

Location:

Owner:

Design Professional in Responsible Charge:

This *Statement of Special Inspections* is submitted as a condition for permit issuance in accordance with the Special Inspection and Structural Testing requirements of the Building Code. It includes a schedule of Special Inspection services applicable to the Project as well as the name of the Coordinating Special Inspector and the identity of other approved agencies to be retained for conducting these inspections and tests. This *Statement of Special Inspections* encompass the following disciplines:

☐ Structural ☐ Mechanical/Electrical
☐ Architectural ☐ Other: _____

The Coordinating Special Inspector shall keep records of all inspections and shall furnish inspection reports to the Building Official and the Registered Design Professional in Responsible Charge. Discovered discrepancies shall be brought to the immediate attention of the Contractor for correction. If such discrepancies are not corrected, the discrepancies shall be brought to the attention of the Building Official and the Registered Design Professional in Responsible Charge. The Special Inspection program does not relieve the Contractor of his or her responsibilities.

Inspections listed are periodic unless indicated to be continuous or required by code to be continuous.

Interim reports shall be submitted to the Building Official and the Registered Design Professional in Responsible Charge.

A *Final Report of Special Inspections* documenting completion of all required Special Inspections, testing and correction of any discrepancies noted in the inspections shall be submitted prior to issuance of a Certificate of Use and Occupancy.

Job site safety and means and methods of construction are solely the responsibility of the Contractor.

Interim Report Frequency: Weekly or ☐ per attached schedule.

Prepared by:

_____
(type or print name)

_____
Signature Date

Design Professional Seal

Owner's Authorization:

_____
Signature Date

Building Official's Acceptance:

_____
Signature Date

Schedule of Inspection and Testing Agencies

This Statement of Special Inspections / Quality Assurance Plan includes the following building systems:

- ☐ Soils and Foundations
- ☐ Cast-in-Place Concrete
- ☐ Precast Concrete
- ☐ Masonry
- ☐ Structural Steel
- ☐ Cold-Formed Steel Framing
- ☐ Spray Fire Resistant Material
- ☐ Wood Construction
- ☐ Exterior Insulation and Finish System
- ☐ Mechanical & Electrical Systems
- ☐ Architectural Systems
- ☐ Special Cases

Special Inspection Agencies	Firm	Address, Telephone, e-mail
1. **Special Inspector**		
2. Inspector		
3. Inspector		
4. Testing Agency		
5. Testing Agency		
6. Other		

Note: The inspectors and testing agencies shall be engaged by Owner or Owner's Agent, and not by Contractor or Subcontractor whose Work is to be inspected or tested. Conflicts of interest must be disclosed to the Building Official prior to commencing Work.

Qualifications of Inspectors and Testing Technicians

The qualifications of all personnel performing Special Inspections are subject to the approval of the Building Official. The credentials of all inspectors and testing technicians shall be provided if requested.

Key for Minimum Qualifications of Inspection Agents:

When Engineer deems it appropriate that the individual performing a stipulated test or inspection have a specific certification or license as indicated below, such designation shall appear below the *Agency Number* on the Schedule.

PE/SE	Structural Engineer – a licensed SE or PE specializing in the design of building structures
PE/GE	Geotechnical Engineer – a licensed PE specializing in soil mechanics and foundations
EIT	Engineer-In-Training – a graduate engineer who has passed the Fundamentals of Engineering examination

American Concrete Institute (ACI) Certification

ACI-CFTT	Concrete Field Testing Technician – Grade 1
ACI-CCI	Concrete Construction Inspector
ACI-LTT	Laboratory Testing Technician – Grade 1&2
ACI-STT	Strength Testing Technician

American Welding Society (AWS) Certification

AWS-CWI	Certified Welding Inspector
AWS/AISC-SSI	Certified Structural Steel Inspector

American Society of Non-Destructive Testing (ASNT) Certification

ASNT	Non-Destructive Testing Technician – Level II or III.

International Code Council (ICC) Certification

ICC-SMSI	Structural Masonry Special Inspector
ICC-SWSI	Structural Steel and Welding Special Inspector
ICC-SFSI	Spray-Applied Fireproofing Special Inspector
ICC-PCSI	Prestressed Concrete Special Inspector
ICC-RCSI	Reinforced Concrete Special Inspector +

National Institute for Certification in Engineering Technologies (NICET)

NICET-CT	Concrete Technician – Levels I, II, III & IV
NICET-ST	Soils Technician - Levels I, II, III & IV
NICET-GET	Geotechnical Engineering Technician - Levels I, II, III & IV

Exterior Design Institute (EDI) Certification

EDI-EIFS	EIFS Third Party Inspector

Other

Soils and Foundations Page of

Item	Agency # (Qualif.)	Scope
1. Shallow Foundations		
2. Controlled Structural Fill		
3. Deep Foundations (Auger Cast Piles)		
4. Load Testing		
4. Other:		

Cast-in-Place Concrete Page of

Item	Agency # (Qualif.)	Scope
1. Mix Design		
2. Material Certification		
3. Reinforcement Installation		
4. Post-Tensioning Operations		
5. Welding of Reinforcing		
6. Anchor Rods		
7. Concrete Placement		
8. Sampling and Testing of Concrete		
9. Curing and Protection		
10. Other:		

Precast Concrete Page of

Item	Agency # (Qualif.)	Scope
1. Plant Certification / Quality Control Procedures ☐ Fabricator Exempt		
2. Mix Design		
3. Material Certification		
4. Reinforcement Installation		
5. Prestress Operations		
6. Connections / Embedded Items		
7. Formwork Geometry		
8. Concrete Placement		
9. Sampling and Testing of Concrete		
10. Curing and Protection		
11. Erected Precast Elements		
12. Other:		

Masonry **Required Inspection Level:** ☐ **1** ☐ **2** Page of

Item	**Agency # (Qualif.)**	**Scope**
1. Material Certification		
2. Mixing of Mortar and Grout		
3. Installation of Masonry		
4. Mortar Joints		
5. Reinforcement Installation		
6. Prestressed Masonry		
7. Grouting Operations		
7. Weather Protection		
9. Evaluation of Masonry Strength		
10. Anchors and Ties		
11. Other:		

Structural Steel Page of

Item	Agency # (Qualif.)	Scope
1. Fabricator Certification/ Quality Control Procedures ☐ Fabricator Exempt		
2. Material Certification		
3. Open Web Steel Joists		
4. Bolting		
5. Welding		
6. Shear Connectors		
7. Structural Details		
8. Metal Deck		
9. Other:		

Cold-Formed Steel Framing Page of

Item	Agency # (Qualif.)	Scope
1. Member Sizes		
2. Material Thickness		
3. Material Properties		
4. Mechanical Connections		
5. Welding		
6. Framing Details		
7. Trusses Trusses		
8. Permanent Truss Bracing Permanent Truss Bracing		
9. Other:		

Mechanical & Electrical Systems Page of

Item	Agency # (Qualif.)	Scope
1. Smoke Control		
2. Mechanical, HVAC & Piping		
3. Electrical System		
4. Other:		

Architectural Systems Page of

Item	Agency # (Qualif.)	Scope
1. Wall Panels & Veneers		
2. Suspended Ceilings		
3. Access Floors		
4. Other:		

Special Cases Page of

Item	Agency # (Qualif.)	Scope

Supplement B - Final Report of Special Inspections

Project:

Location:

Owner:

Owner's Address:

Architect of Record:

Structural Engineer of Record:

To the best of my information, knowledge and belief, the Special Inspections required for this project, and itemized in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Special Inspector

_____
(Type or print name)

_____
Signature Date

Licensed Professional Seal

Agent's Final Report

Project:

Agent:

Special Inspector:

To the best of my information, knowledge and belief, the Special Inspections or testing required for this project, and designated for this Agent in the *Statement of Special Inspections* submitted for permit, have been performed and all discovered discrepancies have been reported and resolved other than the following:

Comments:

(Attach continuation sheets if required to complete the description of corrections.)

Interim reports submitted prior to this final report form a basis for and are to be considered an integral part of this final report.

Respectfully submitted,
Agent of the Special Inspector

_____
(Type or print name)

_____
Signature Date

Licensed Professional Seal or Certification

Supplement D - Fabricator's Certificate of Compliance

Each approved fabricator that is exempt from Special Inspection of shop fabrication and implementation procedures per section 1704.2 of the International Building Code must submit a *Fabricator's Certificate of Compliance* at the completion of fabrication.

Project:

Fabricator's Name:

Address:

Certification or Approval Agency:

Certification Number:

Date of Last Audit or Approval:

Description of structural members and assemblies that have been fabricated:

I hereby certify that items described above were fabricated in strict accordance with the Contract Documents.

_____ _____

Signature Date

_____

Title

Attach copies of fabricator's certification or building code evaluation service report and fabricator's quality control manual.

PART 1 – GENERAL

1.01 GENERAL

A. All materials and equipment will be tested and inspected to insure full and complete compliance with the Specifications as determined by the County. All testing shall be in accordance with the American Society for Testing Materials and other Specifications as specified herein. Responsibility for performing testing shall be in accordance with the Detailed Specifications.

B. The County will perform the tests tabulated in the General Conditions, Article GC 19, "Inspection and Testing".

C. The Contractor shall perform all other testing laboratory services and furnish all test reports in accordance with the requirements of the General Conditions, Article GC 19, "Inspection and Testing".

D. The Contractor shall perform all leak testing of concrete structures as described herein.

1.02 FIELD TESTING OF EQUIPMENT

A. General:
   1. Field testing of equipment shall conform to the requirements of the General Conditions, Article GC 19, "Inspection and Testing", the Technical Specifications and as hereinafter specified.

B. Preliminary Field Tests, Yellow Tag:
   1. As soon as conditions permit, after the equipment has been secured in its permanent position, the Contractor shall check the equipment for alignment, direction of rotation and absence of defects.
   2. Purpose of tests is to determine if equipment:
      a. Is properly installed.
      b. Complies with operating cycles.
      c. Is operational and free from overheating, overloading, vibration, or other operating problems.
   3. The Contractor shall flush all bearings, gear housings, etc., in accordance with the manufacturer's recommendations, to remove any foreign matter accumulated during shipment, storage or erection. Lubricants shall be added as required by the manufacturer's instructions.
   4. The Contractor shall furnish all labor, materials, instruments, fuel, incidentals, and expendables required, unless otherwise provided.
   5. The Contractor shall make all changes, adjustments and replacements required to place equipment in service and test it.
   6. The Engineer and the County shall be given sufficient prior notice to witness tests.
   7. When the Contractor has demonstrated to the Engineer that the equipment is ready for operation, a yellow tag will be issued. The tag will be signed by the Engineer or his designated representative, and attached to the equipment. The tag shall not be removed.
   8. Preliminary field tests, yellow tag, must be completed before equipment is subjected to final field tests, blue tag.

C. Final Field Tests, Blue Tag:
   1. Upon completion of the installation, and at a time approved by the Engineer, equipment will be tested by operating it as a unit with all related piping, ductwork, electrical controls and mechanical operations.

2. To the maximum extent possible, the Contractor shall perform final field tests of equipment prior to initial startup and operation of the Project. Where this is not practicable, final field tests shall be performed during initial startup and operation of the Project.
3. Purpose of the tests is to demonstrate that equipment is:
   a. Properly installed.
   b. Completely ready for operation by the County personnel.
   c. In compliance with design conditions, material specifications and all other requirements of the Contract Documents.
4. The Contractor shall submit the test procedure for approval by the Engineer. The procedure shall specify the duration and the parameters of the test.
5. The Contractor shall notify the Engineer at least twenty-four (24) hours prior to beginning of tests. The Contractor shall keep notes and data on tests and submit copy to the Engineer. The Engineer and the County's operating personnel shall witness all tests.
6. The equipment will be placed in continuous operation as prescribed or required and witnessed by the Engineer or his designated representative.
7. Each pump shall be tested at maximum rated speed for the number of points specified in the Technical Specifications, but no less than four points, on the pump curve for capacity, head and electric power input. The rated motor nameplate current and power shall not be exceeded at any point within the specified range. Vibrometer readings shall be taken when directed by the Engineer and the results recorded.
8. Pumps with drive motors rated at less than five horsepower shall only be tested for excess current or power when overheating or other malfunction becomes evident in general testing.
9. Until final field tests are acceptable to the Engineer, the Contractor shall make all necessary changes, readjustments and replacements at no additional cost to the County.
10. Defects which cannot be corrected by installation adjustments will be sufficient grounds for rejection of any equipment.
11. Upon acceptance of the field tests a blue tag will be issued. The tag will be signed by the Engineer and attached to the unit. The tag shall not be removed, and no further construction Work will be performed on the unit, except as required during startup operations and directed by the Engineer.
12. All costs in connection with such tests including all materials, equipment, instruments, labor, etc. shall be borne by the Contractor.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 015000 – TEMPORARY FACILITIES AND CONTROLS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. Temporary facilities and controls shall be provided in the manner designated hereinafter at the project site.

B. Coordinate and install temporary facilities and controls in accordance with the requirements of the local authorities or utility companies having jurisdiction and in accordance with all state, federal and local codes, and regulations.

C. At the completion of the Work, or when the temporary facilities and controls are no longer required, subject to the approval of the Owner, remove temporary facilities and controls and restore facilities to their original conditions

D. Costs in connection with the temporary electric, lighting, heating and ventilation, and other miscellaneous temporary facilities and controls including but not limited to, installation, maintenance, relocation, and removal shall be borne by the Contractor.

1.02 TEMPORARY WATER AND SANITARY FACILITES

A. Provide and pay all costs for temporary toilet facilities in sufficient numbers, for the Contractor's and subcontractors' personnel on this Project.

B. Sanitary facilities shall be properly screened from public observation and shall be provided and maintained at suitable locations by the Contractor including Contractor's staging area, all as prescribed by state labor regulations and local ordinances. This system shall not be connected to the local sanitary sewer system and the contents of same shall be removed and disposed of in a satisfactory manner, as the occasion requires.

C. The Contractor shall rigorously prohibit the nuisances within, on, or about the Work.

D. Owner sanitary facilities and locker rooms are prohibited from Contractors' and subcontractors' use.

1.03 TEMPORARY ELECTRICAL FACILITIES

A. Furnish and install a temporary electrical facilities system which shall consist of temporary electric service points, a temporary general lighting system, a security lighting system, a safety lighting system, and service to the Contractor's field offices.

B. Submit a drawing showing the proposed temporary electrical facilities system layout for approval by the Engineer prior to installation.
   1. Work Included: Temporary work shall include the following:
      a. Furnish and pay for all labor, material, and equipment for the installation of the temporary electrical facilities system. The installation shall comply with all applicable requirements of the National Electric Code and any other codes or bodies having jurisdiction.
      b. Furnish and pay for all labor material and equipment for the maintenance of the temporary electrical facilities system.
      c. Furnish and pay for labor, materials, and equipment for removing all temporary facilities.

C. Requirements:
   1. Temporary electrical facilities system shall be as herein specified and required for the contractor's use and shall be provided no later than thirty days after the date of Notice to Proceed.

D. Temporary Electric Service Points:
   1. Furnish, install, and maintain a temporary power distribution point local to the work area.
   2. At the temporary power distribution point, the Contractor shall furnish and install an overcurrent protection device. The overcurrent protection device shall be rated for 480 volts, three-phase, and shall be sized for Contractor's temporary electric requirements.
   3. Utilize an existing temporary service point designated by the Owner for serving the temporary electrical requirements. The Contractor shall modify the identified temporary distribution point as required to provide temporary electric service for the Work shown and specified. Provide a temporary transformer, a 100 Amp circuit breaker and any other equipment necessary and required to provide the temporary electric system with the specified capacity. Provide separate distribution circuit breakers or fused switches for disconnection and overcurrent protection of the temporary electrical facilities fed from the service point which shall include the Contractor's field offices and the security lighting system for the Staging Area.
   4. Furnish and install circuit breakers or fused switches, transformers, wiring and conduit as required for the temporary power distribution point.
   5. Distribution circuit breakers or fused switches shall be furnished and installed at each location for disconnection and overcurrent protection of the temporary electrical facilities, including the temporary general lighting system, the security lighting system, and the safety lighting system.
   6. At the completion of the project, remove the temporary electric service point facilities to the condition they were prior to construction.

E. Temporary General Lighting System:
   1. Provide and maintain a temporary lighting system. The system shall conform to the applicable Federal and State codes, shall meet the illumination requirements specified herein, and shall meet the approval of the Owner.
   2. Temporary general lighting system shall provide 120-volt receptacles and lighting for access to and egress from the work and for safe and expeditious construction within designated enclosed areas of the structure or structures.
   3. Temporary general lighting system shall consist of wiring, switches, necessary insulated supports, poles, fixtures, receptacles, 100-watt lamps, guards, cutouts, and fuses as specified shown or required.
   4. Furnish lamps, fuses, receptacles, and cords for the temporary general lighting system and shall replace broken and burned out lamps and blown fuses for the system.
   5. Temporary general lighting system shall be installed progressively in the structure as the areas are enclosed or as lighting becomes necessary because of partial enclosure.
   6. Required Illumination for Work Lighting:
      a. General: Five foot-candles.
      b. Stairs: Ten foot-candles.
      c. Construction Plant and Shops: Ten foot-candles.
      d. For Detail and Finishing Work: Twenty foot-candles.
      e. For Testing and Inspection: Thirty foot-candles.
      f. At First-aid Stations: Thirty foot-candles.
      g. Areas of OWNER’S Operations: One 300-watt lamp at intervals of 15 feet on centers.
   7. Maintain the temporary general lighting system in safe working order.
   8. Arrange and install the lamps in a manner to provide an even distribution of illumination as necessary and required over the work areas.
   9. If necessary and required, install receptacles in such a manner as to reach any point in the work areas with an extension cord not to exceed 40 feet in length.
   10. In case of overloading of circuits, the Owner will restrict the use of tools as required for the correct loading.
   11. The temporary general lighting system shall be used for small power purposes only.
   12. Hand tools such as drills, hammers and grinders, may be connected to the temporary general lighting system provided that they are suitable for 120 volt, single phase, 60 hertz

operation and do not have a power requirement exceeding 1,500 volt amperes. Only one unit may be connected to a single receptacle and shall not be connected to lighting outlets. Cords of tools shall not exceed 40 feet in length.

13. No Contractor will be permitted to proceed with any portion of his work which in the opinion of the Engineer, is not adequately illuminated. If any Work by any other Contractor requires special lighting other than what is provided, the Contractor shall arrange for same.
14. Keep the temporary general lighting system in service each working day, from Monday through Friday inclusive, by energizing the system at 7:00 A.M. and de energizing the system at 3:30 P.M.
15. Any Contractor requiring the use of a temporary general lighting system other than during the times set forth in the preceding paragraph from Monday through Friday, or at any time on Saturdays, Sundays or Holidays, shall pay the costs of energizing or de energizing the system and for keeping the system in operation.
16. Temporary general lighting system shall be removed in its entirety at the completion of the project.

F. Security Lighting System:
   1. Furnish, install, and maintain a security lighting system to illuminate the Staging Area and the construction site outside the building.
   2. Security lighting system shall consist of floodlights equal to Crouse Hinds Cat. No. MVD 4HCW O PC DF AF VS AF 400-watt LED, Cat. No. ML2590 photocell, Cat No. ML5547 vandal shield and Cat. No. 105 N11 bracket for wood pole mounting. Floodlights shall be mounted approximately 30 feet above the ground.
   3. Each floodlight shall be complete with a constant wattage, high power factor ballast in a cast aluminum housing, a flat clear lens of heat and impact resistant glass, photo control, lamp, and suitable mounting hardware.
   4. Photometric performance shall be equal to that of the above specified unit with a beam spread of approximately 150 degrees horizontal to 80 degrees vertical and with a beam efficiency of not less than 55 percent,
   5. Poles shall be 35-foot, class F wood and shall be securely set five feet in the ground.
   6. Wiring for the security lighting system may be installed overhead with clearance above vehicular traffic. The security lighting system shall always be properly maintained and energized with each floodlight controlled by a photocell installed on the floodlight. The photocells shall be adjusted so that all floodlights are energized at approximately the same time. Broken, and burned out lamps shall be replaced.
   7. Security lighting system shall be installed and made operative within 30 days after the date of the Notice to Proceed.
   8. Security lighting system shall be removed in its entirety at the completion of the project

G. Safety Lighting:
   1. Provide, install, and maintain sufficient lighting fixtures to provide adequate light to ensure safe access to, egress from, and passage through the construction areas between the hours of 4:30 P.M. and 7:00 A.M. Monday through Friday and 24 hours per day for Saturdays, Sundays, and Holidays. The lighting system shall be operated by a time clock. Fixtures shall be 100 watt and shall be provided, as a minimum at every landing of every stairway and every 50 feet along passageways. The safety lighting system shall be installed progressively in structures as the designated areas are enclosed or as lighting becomes necessary because of partial enclosure. This lighting is not intended for construction purposes.

H. Contractors' Field Offices:
   1. Extend the temporary electric service from the tie-in to the service point specified in Paragraph 1.03 to the Contractor's field office within the Staging Area.
   2. The Contractor shall be responsible for providing his own telephone facilities as required.

3. Electric service for connection to construction trailers is available from the Plant. The Contractor shall coordinate with the Plants for the power source (motor control center in local building) and shall install the electrical service as required to each Field Office.

I. Additional Facilities:
   1. Should any portion of any Contractor's work require light or power in addition to that supplied by the temporary general lighting system herein described, furnish, install and maintain such additional temporary lighting and power facilities at own expense. Additional temporary lighting shall be sufficient for safe access to and egress from such work, and for safe expeditious construction.
   2. The installation of additional facilities shall comply with all applicable requirements of the National Electric Code and any other codes of enforcing bodies having jurisdiction and shall be installed so as not to interfere with the work of other Contractors.
   3. Upon completion of the work under contract, remove all additional facilities installed.

1.04 TEMPORARY HEATING FACILITIES

A. Temporary construction heating shall be provided by the Contractor responsible for the Work involved for all cold weather protection of his own equipment, Work, and his employee's comfort at all the times.

B. Provide all temporary heat for heating the interior of all structures and building areas, which is necessary for the protection of all Work and equipment of the Contract for the comfort of his employees or his subcontractor's employees, after the building or structure is temporarily enclosed. Hot water or steam from the existing plant system will not be available for use as temporary heating. The following requirements shall apply:
   1. All temporary heating methods proposed by Contractor shall be submitted to the Owner for approval and must comply with all federal, state and county rules and regulations.
   2. Temporary construction heat for "cold weather protection" shall be provided by Contractor responsible for the Work involved. "Cold weather protection" shall be considered to include both temporary heat and protective covers or enclosures required during the construction period prior to the enclosure of new buildings or buildings and structures being remodeled. "Cold weather protection" shall be provided until all construction requirements under the Contracts are complied with, or until the enclosure of a new building or structure complies with the requirements for temporary building heating as hereinafter specified in Paragraph 1.04.

C. Provide temporary heat for the temporary building heating system. The systems shall be gas or oil fired, steam, hot water, or warm air type. Electric heating will not be permitted.

D. No salamanders or other direct fired equipment will be allowed in areas of existing buildings, or in new construction areas where the use of such equipment will damage or deteriorate the construction or finishes or is harmful to employees working in the area.

E. Temporary building heating systems shall be complete, including pumps, radiators, unit heaters, water and heating piping, insulation, controls, or any other equipment necessary, all furnished and installed by Contractor. Systems shall include boilers, fuel, and fuel storage facilities or any other equipment necessary, all furnished and installed and paid for by the Contractor, including fuel and electrical costs. All fuel oil tanks shall be provided with adequate secondary containment and the fuel oil systems shall comply with Nassau County Fire Prevention Ordinance-Article III. Special notice is given to the Contractor that the electrical service and cost relative to obtaining temporary heating beyond those provided under the temporary electrical facilities shall be the responsibility of the Contractor and provided for under temporary heating. This includes, but is not limited to, the cost of providing temporary light if it should be required.

F. A building, structure or gallery shall be considered to be temporarily enclosed when the area is covered by a permanent structural slab or deck and all openings through the permanent slab or deck are covered to prevent the entrance of rain or snow. Intermediate floor structures or multi floor buildings or structures shall be temporarily enclosed subject to the same requirements. The building shall be considered to be temporarily enclosed when one of the permanent exterior wall elements, concrete, block, or the permanent exterior wall, or facing material, is installed and all openings through that element are covered or temporarily enclosed to prevent the entrance of rain, snow, or direct wind. Openings through structures, intermediate floors or exterior wall elements shall be considered to be enclosed when that opening is covered with minimum ten mil plastic or minimum twelve (12) ounce waterproof duck canvas tarpaulins or with minimum three eighths inch thickness exterior grade plywood. Temporary covers or enclosures for openings shall be the responsibility of the Contractor.

G. Temporary building heating shall be provided from the first day of October to the last day of the following April. The system shall be capable of maintaining a minimum of fifty-five degrees Fahrenheit (55°F) simultaneously in all areas of construction in buildings, structures, or galleries. Temporary heating shall be provided on a twenty-four hours per day, seven days per week basis. Where it is determined by the Owner that higher temperatures are required in a particular area to protect installed equipment or new construction, it shall be so, provided under this Contract.

H. Provide and pay for all electric wiring and electrical accessories required for the temporary heating system.

I. Temporary heating equipment shall not be located to interfere with the new construction Work. Heating system equipment shall not cause undue noise or fumes and shall be enclosed by wire fencing, or other means to provide protection to personnel.

1.05 TEMPORARY VENTILATION FACILITIES

A. Temporary construction ventilation shall be provided by the Contractor for the protection of his equipment, Work and his employees' comfort and safety always.

B. Provide all temporary ventilation for ventilating all structures and building areas, both above and below ground level, which is necessary for the protection of all Work and equipment of this Contract or for the comfort and safety of his employees, his Subcontractor's employees, or the employees of the other Contractors, after the building or structure is enclosed.

C. Ventilating systems may be forced or gravity type and shall be complete with fans, motors, inlets, outlets, ductwork, heaters, controls or any other equipment necessary, all furnished and installed by the Contractor responsible for the Work involved. The following additional requirements shall apply:
   1. All temporary ventilation methods proposed by the Contractor shall be submitted to the Owner for approval and must comply with all federal, state and county rules and regulations.
   2. Temporary ventilation shall be provided by the Contractor until the building or structure is enclosed.
   3. A building or structure shall be enclosed as hereinbefore specified in Paragraph 1.05, Temporary Heating Facilities.
   4. Ventilation air shall be heated to those temperatures specified for space or room temperatures as hereinbefore specified in Paragraph 1.05, Temporary Heating Facilities. Where dehumidification is required to prevent mildew or moisture forming on equipment, Work or structures in areas being ventilated, it shall be provided by the Contractor.

D. Provide and pay for all equipment and labor to operate the temporary ventilation system after a building or structure is enclosed. Heating required for the ventilation system shall be provided by the temporary heating system specified in Paragraph 1.05.

E. Provide and pay for all electric wiring and electrical accessories required for the temporary ventilation system.

F. Temporary ventilation equipment shall not be located to interfere with the operation of the new construction Work. Protective devices shall be provided for the protection of the personnel.

G. Temporary ventilation shall be supplied to all buildings or structures below grade at a minimum of three air changes per hour and the outside air shall be tempered to room temperature levels unless otherwise noted. Temporary ventilation shall be supplied to all new buildings or structures above grade only where required to protect equipment and Work being installed or for safety of employee.

1.06 PROTECTION OF WORK AND MATERIALS

A. Protection Requirements:
   1. During the progress of the Work and up to the date of Final Payment, the Contractor shall be solely responsible for the care and protection of all Work and materials covered by the Contract. To prevent damage, injury or loss, actions shall include, but not be limited to, the following:
      a. Store apparatus, materials, supplies, and equipment in an orderly, safe manner that will not unduly interfere with the progress of the Work or the work of any other contractor or utility service company.
      b. Provide suitable storage facilities for all materials, which are subject to injury by exposure to weather, theft, breakage, or otherwise.
      c. Place upon the Work or any part thereof only such loads as are consistent with the safety of that portion of the Work.
      d. Clean up frequently all refuse, rubbish, scrap materials, and debris caused by his operations, to the end that always the Site of the Work shall present a safe, orderly and workmanlike appearance.
      e. Provide barricades and guard rails around openings, for scaffolding, for temporary stairs and ramps, around excavations, elevated walkways and other dangerous areas as deemed necessary by Engineer.
   2. Protect the existing Work and material from damage by his/her workers and shall be responsible for repairing any such damage at no additional cost to the Owner.
   3. Protect trees, shrubbery and other natural features or structures from being cut, trimmed, or injured in his areas of Work. Trees adjacent to the Site of Work shall be protected and temporary supports provided for long branches. Stored materials and equipment shall be in cleared spaces, away from all trees and shrubs, and confined to areas as directed by the Engineer.
      a. Temporary fences or barricades shall be installed to protect trees and plants in areas subject to traffic.
      b. No fires will be permitted at the site.
      c. Within the limits of the Work, water trees and plants that are to remain, to maintain their health during construction operations.
      d. Cover all exposed roots with burlap that shall be kept continuously wet. Cover all exposed roots with earth as soon as possible. Protect root systems from mechanical damage and damage by erosion, flooding, run off or noxious materials in solution.
      e. If branches or trunks are damaged, prune branches immediately and protect the cut or damaged areas with emulsified asphalt compounded specifically for horticultural use in a manner approved by Engineer.
      f. All damaged trees and plants that die or suffer permanent injury shall be removed when ordered by the Engineer and replaced by a specimen of equal or better quality.
   4. All Work and materials shall be protected in accordance with the requirements of the Agreement, Article VI, "Protection"; General Conditions, Articles GC 17, "Materials and

Equipment, Approvals Substitutions and Deviations", GC 21, "Protection Requirements", and GC 24, "Barricades, Warning Signs and Lights".

B. Maintenance of Egress:
   1. During the course of demolition and construction Work of this Project, the Contractor shall maintain and keep free of debris, materials or equipment points of required egress in accordance with the requirements of the Nassau County Fire Commissioner and Fire Safety Regulations.
   2. The Contractor in his area of Work shall maintain egress as herein specified.
   3. In active process areas, the Contractor shall not be permitted to store or stockpile material. Debris or other material shall be removed daily which may obstruct plant personnel from operating or maintaining active equipment and piping.

C. Temporary Construction Fencing:
   1. The Work areas of the Project Site shall always be enclosed by temporary fencing to ensure security.
   2. Temporary fencing shall not be less than six feet in height. Fabric shall be ten-gauge minimum, electrically welded wire, forming a rectangular mesh with opening two by four inches and three rows of double barb ten-gage wire on angle brackets measuring two feet vertically. Fabric shall be mounted on heavy duty steel tee spaced at intervals not exceeding ten feet.
   3. Furnish, erect, relocate and maintain all temporary fencing. Upon completion of the Project all temporary fencing shall be removed and disposed of.
   4. All Work in connection with the temporary fencing shall be done at no additional cost to the Owner.

D. Protection of Existing Structures:
   1. Underground Structures:
      a. Underground structures are defined to include, but not be limited to, all sewer, water, gas, and other piping, and manholes, chambers, electrical and signal conduits, tunnels and other existing subsurface work located within or adjacent to the limits of the Work.
      b. All underground structures known to the Engineer, except water, sewer, electric and telephone service are shown on the Drawings. This information is shown for the assistance of the Contractor in accordance with the best information available but is not guaranteed to be correct or complete.
      c. The Contractor shall explore ahead of his trenching and excavation Work and shall uncover all obstructing underground structures sufficiently to determine their location, to prevent damage to them and to prevent interruption of the services which such structures provide. If the Contractor damages an underground structure, he shall restore it to original condition at his expense.
      d. Necessary changes in the location of the Work may be made by the Engineer, to avoid unanticipated underground structures.
      e. If permanent relocation of an underground structure or other subsurface facility is required and is not otherwise provided for in the Contract Documents, the Engineer will direct the Contractor in writing to perform the Work, which shall be paid for under the provisions of the Agreement.
   2. Surface Structures:
      a. Surface structures are defined as all existing buildings, structures, and other facilities above the ground surface. Included with such structures are their foundations or any extension below the surface. Surface structures include, but are not limited to, buildings, tanks, walls, bridges, roads, dams, channels, open drainage, piping, piles, wires, posts, signs, markers, curbs, walks and all other facilities that are visible above the ground surface.
   3. Protection of Underground and Surface Structures:

a. The Contractor shall sustain in their places and protect from direct or indirect injury all underground and surface structures located within or adjacent to the limits of the Work. Such sustaining and supporting shall be done by the Contractor in a careful manner and as required by the Owner. Before proceeding with the Work of sustaining and supporting such structure, the Contractor shall satisfy the Engineer that the methods and procedures to be used have been approved by the Owner.
b. The Contractor shall assume all risks attending the presence or proximity of all underground and surface structures within or adjacent to the limits to the Work. The Contractor shall be responsible for all damage and expense for direct or indirect injury caused by his Work to any structure. The Contractor shall repair immediately all damage caused by his Work to the satisfaction of the owner of the damaged structure.

4. All other existing surface facilities, including but not limited to guard rails, posts, guard cables, signs, poles, markers, and curbs, which are temporarily removed to facilitate installation of the Work shall be replaced and restored to their original condition at Contractor's expense.

E. Protection of Floors and Roofs:
1. Protect floors, roofs and stairs from overloads, dirt, and damage during entire construction period. In areas subject to foot traffic, secure heavy paper, sheet goods, or other materials in place. For storage of products, lay tight wood sheathing in place. Cover walls and floors of elevator cars and surfaces of elevator car doors used by construction personnel.
2. Proper protective covering shall be used when moving heavy equipment, when handling materials or other loads, when painting, when handling mortar and grout and when cleaning walls and ceilings.
3. Use metal pans to collect all oil and cuttings from pipe, conduit, or rod threading machines and under all metal cutting machines.
4. Concrete floors less than 28 days old shall not be loaded without written permission of the Engineer. No floor, roof or slab shall be loaded more than the design loading shown on the Drawings.
5. Roof slabs shall not be loaded without written permission of the Engineer. Prohibit use of finished roofing surfaces for traffic of any kind, and for storage of any products. When activity must take place to carry out the Work, obtain recommendations of installer for protection of surface. Install recommended protection and remove on completion of that activity. Restrict use of adjacent unprotected areas.
6. Restrict access to roofs and keep clear of existing roofs except as required by the new Work.
7. If access to roofs is required, roofing, parapets, openings, and all other construction on or adjacent to roof shall be protected with suitable plywood or other approved means.

F. Protection of Installed Products and Landscaping:
1. Provide protection of installed products to prevent damage from subsequent operations. Remove protection facilities when no longer needed, prior to completion of Work.
2. Control traffic to prevent damage to equipment, materials, and surfaces.
3. Provide covering to protect equipment and materials from damage.
a. Cover projections, wall corners, and jambs, sills, and soffits of openings, in areas used for traffic and for passage of products in subsequent Work.
4. Prohibit traffic of any kind across planted lawn and landscaped areas outside of the work area.

G. Protection from Flood:
1. Do not allow any areas turned over to him for commencement of Work, to flood. Keep all existing and new facilities within Work area free of any accumulations of water. Provide, install, and operate sufficient pumps for this purpose. Continuous monitoring for floods and protection of structures from damage and flotation shall be provided. Install any combination of suitable dikes, well points, pumps, and the like to protect the Work until it is accepted.

H. Special Protection of Machinery and Equipment:
   1. Take all protective measures to the satisfaction of the Owner necessary to ensure that inclement weather or dust and debris from demolition does not enter any of the mechanical or electrical equipment rooms or enclosures. Enclosures shall be provided where necessary to prevent contamination of the air. All protective measures shall be furnished, installed, lighted, ventilated, maintained, and removed at the Contractor's own cost.
   2. Interior dustproof covers shall be a heavy reinforced polyethylene film curtain, minimum thickness 6 mils, supported by wood framing. All seams and penetration shall be sealed with duct tape on two sides. Junctions with existing walls, floors and ceilings shall be made with a double fold secured with a backing strip anchored to the existing wall, floor, and ceiling.
   3. The Contractor shall be responsible for all damage to existing structures, equipment, and facilities caused by his construction operations and must repair all such damage when and as ordered at no additional cost to the Owner. All work shall be done in accordance with the requirements of Section 01039, Demolition and Removal of Existing Structures and Equipment.

I. Emergency Repair Crews
   1. In case the Contractor's operations disrupt plant operations, the treatment process or the operating facilities herein before described, at any time, at his cost immediately make all repairs or replacements and do all work necessary to restore the plant to operation to the satisfaction of the Owner. Such work shall progress continuously to completion on a 24-hour/day, 7-workday/week basis. Provide the services of emergency repair crews, available on call 24 hours per day.

1.07 ACCESS ROADS, PARKING, STAGING, STORAGE AND WORK AREAS

A. Contractor's Staging and Storage Area
   1. Construct a Contractor's Staging Area as shown on the Contract Drawings. The staging area shall be leveled, graded, and seeded before completion of the Contract.
   2. The staging area shall be drained so that no ponding of runoff water shall occur in the Staging Area or adjacent areas.
   3. Erect six-foot high galvanized chain link fencing and gates around the staging area as specified in Paragraph 1.6.C.
   4. The Contractor shall provide pavement and utilities in the Staging Area and shall maintain all sections of the staging area in a suitable manner, including the cutting of grass, weeding, and preventing the accumulation of debris. Provide electrical utilities in the staging area.
   5. At the completion of the project, remove all debris not limited to gravel, grout, wood, etc., from the staging area off-site. Grade the staging area level and furnish a minimum of six (6) inches of topsoil, which will be unloaded, graded and hydro-seeded as directed by the Engineer.

B. Access Roads:
   1. Access roads will be provided by the Contractor in accordance with the requirements of the General Conditions, Article GC 22, "Access Roads and Parking Areas", the Drawings and the applicable Technical Specifications.
   2. The Contractor shall take all necessary precautions to protect traffic, including but not limited to, complying with the requirements of the General Conditions, Articles GC 23, "Traffic Regulations" and GC 24, "Barricades, Warning Signs and Lights".
   3. The Contractor shall always post speed limit signs to be adhered to in the vicinity of the staging and work areas.

C. Parking, Storage and Work Areas:
   1. No on-site parking is permitted.

2. Construct and maintain suitable storage areas for his use within the staging area designated on the Drawings.
3. The Contractor will be required to arrange his Work and dispose of his materials in such manner as to cause the least interference with the Work of other Contractors working within the same area.
4. No Contractor shall claim exclusive occupancy of areas within or adjacent to the limits of his Work under this Contract. The Owner and its employees and the Contractors for other contracts shall also have access to these areas.
5. Modify any storage areas to cause minimum damage to the landscape and shall comply with the directions of the Owner. At the completion of the Work the surfaces of the land used for storage areas shall be restored by the Contractor to the satisfaction of the Owner and the Engineer.

1.08 CONTRACTOR'S FIELD OFFICE

A. Furnish, equip, and maintain a field office for his use at the Site during the period of construction. The Contractor shall provide his own telephone service and shall have readily accessible, at the field office, copies of the Contract Documents, latest approved Shop Drawings and all Project related correspondence, Change Orders, etc.

B. Contractor's field office shall be in the Staging Area.

C. The Contractor shall provide a Contractor's field office with the minimum facilities specified. Provide all required storage and work sheds.
   1. Field Office and Furnishings:
      a. Acceptable appearance, weatherproof building, or trailer with lockable door.
      b. Telephone service.
      c. Six protective helmets for visitor's use.
      d. Exterior identifying sign.
      e. Company sign no larger than four (4)-feet by eight (8)- feet.
   2. Remove office and sheds upon Final Acceptance unless otherwise approved by the Engineer.

1.09 SECURITY

A. It shall be the responsibility of the Contractor to make whatever provisions deemed necessary to safely guard all Work, materials, equipment and property from loss, theft, damage, and vandalism. The Contractor's duty to safely guard property shall include the Owner's property and other private property from injury or loss in connection with the performance of the Contract.

B. The Contractor may make no claim against the Owner for damage resulting from trespassing.

C. The Contractor shall repair all damage to the property of the Owner and others arising from failure to provide adequate security.

D. If existing fencing or barriers are breached or removed for purposes of obstruction, the Contractor shall provide and maintain temporary security fencing equal to the existing one, in a manner satisfactory to the Engineer and the Owner.

E. Security measures taken by the Contractor shall be at least equal to those usually provided by the Owner to protect existing facilities during normal operation.

F. Maintain the security program throughout construction until the date of Substantial Completion and occupancy precludes need for Contractor's security program.

G. The Contractor's employees shall be issued identification badges, which shall always be displayed, as per Section 01356, Safe and Healthful Working Conditions, Paragraph 1.5.F.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 015116 – TEMPORARY FIRE PROTECTION

PART 1 – GENERAL

1.01 DESCRIPTION

A. Scope:
   1. The Contractor shall provide temporary fire protection at the Cedar Creek WPCP, for all areas where work under this Contract is being performed and throughout the Project, until the project is completed. Remove temporary fire protection when the project is completed.
   2. The Contractor shall comply with Section 901.7 and 1404.5 of the Fire Code of New York State.
   3. The Contractor shall pay all costs associated with temporary fire protection, including installation, maintenance, and removal.
   4. The Contractor shall conform to provisions of this Section and Laws and Regulations.

B. Reference Standards and Regulatory Requirements:
   1. Comply with applicable provisions of:
      a. NFPA Standard No. 10, Portable Fire Extinguishers.
      b. NFPA Standard No. 241, Safeguarding Building Construction and Demolition Operations.
      c. Fire Code of New York State, Section 901.7.
      d. Fire Code of New York State, Section 1404.5
   2. Temporary fire protection shall conform to Laws and Regulations.

1.02 REQUIRED TEMPORARY FIREFIGHTING EQUIPMENT

A. Provide portable fire extinguishers, rated not less than 2A or 5B in accordance with NFPA Standard No. 10 for each temporary building and for every 3,000 square feet of floor area under construction.

B. Provide portable fire extinguishers 50 feet maximum from all points in protected area.

1.03 FIRE PREVENTION AND SAFETY MEASURES

A. Prohibit smoking in hazardous areas and inside of the County's buildings. Provide visible, suitable warning signs in areas that are continuously or intermittently hazardous.

B. Storage of Flammable and Combustible Products:
   1. Use metal safety containers for storing and handling flammable and combustible liquids and materials.
   2. Do not store flammable or combustible liquids and materials in or near stairways or exits.

C. Maintain clear exits from all points at the Site.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 015213 – FIELD OFFICES AND SHEDS

PART 1 – GENERAL

1.01 SECTION INCLUDES

A. Furnishing of the Engineer's Field Office (Trailer).

B. The Engineer's Field Office shall be furnished by the General Construction Contractor within the time period specified hereinafter.

C. Furnish the following in accordance with the specifications contained herein as follows:
   1. Miscellaneous equipment and supplies
   2. Materials
   3. Services as may be specified herein.

D. Temporary electric shall be installed to the Engineer's trailer within two (2) days from the date that the trailer is on-site and is ready for power as notified by the Engineer.

1.02 - SERVICE

A. Applications for electrical service shall be completed by the Contractor.

B. Provide 100-amp temporary power to the Engineer's trailer.
   1. Wire and electrify the trailer.
   2. Maintain the service throughout the project up to final completion.
   3. Remove the service prior to the last day of final completion.

1.03 – CARE AND PLACEMENT

A. Field office shall be place where directed by the Engineer in accordance with site utilization requirements.

B. All field offices shall be installed to meet all standard of the Occupational Safety and Health Act of 1970 and subsequent revisions.

C. In the event of damage to existing facilities, including but not limited to: tanks, driveways, walks, pavement, buildings, pipes, conduits, valves, and electrical facilities then immediately make all repairs and replacements to an equal condition prior to the event.

1.04 - QUALITY PERFORMANCE

A. Comply with and perform all work in accordance with the requirements of local authorities and utility companies having jurisdiction.

1.05 - SUBMITTALS

A. Submit the following:
   1. Floor plan of the proposed Engineer Field Office.
   2. Catalog cuts of miscellaneous equipment and supplies if they are different from that specified.

PART 2 – PRODUCTS

2.01 - CONTRACTOR OFFICE

A. Provide and maintain during the life of this contract a separate and suitable office near the site that shall be used as the Contractor's superintendent office.

B. Provide adequate facilities for maintaining record documents, for holding small meetings and a telephone upon which calls may be received from Owner, Engineer and others. The telephone shall be equipped with a fax machine and an answering machine.

C. Install, maintain, and repair if necessary, temporary electric and telephone to their own field office.

2.02 – MATERIALS, EQUIPMENT AND SERVICES FURNISHED TO THE OWNER BY THE CONTRACTOR

A. Furnish the following equipment and services. All items specified herein shall be new and remain the property of the Owner unless otherwise stated. The following shall be furnished:
   1. Computer:
      a. Laptop computer systems, Dell or approved equal, with the following:
      b. Processor: 10th gen Intel® Core™ i7-10850H Processor (2.7GHz, 12M cache)
      c. Operating System: Windows 10 Professional English/French 64bit
      d. Office Productivity Software: Microsoft® Office Professional 2019, English, French and Spanish
      e. Dell Data Protection |Encryption Security SW: 1 Year ProSupport Plus with Next Business Day Onsite Service
      f. Adobe Creativity and Productivity Software: Adobe® Acrobat® Professional 2020
      g. Video Card: Nvidia GeForce MX250 Discrete Graphics with Thunderbolt for Intel 10th Gen Core i7-10850HIntel® Integrated HD Graphics 4400
      h. Hard Drive: 500GB Solid State Hybrid DriveM.2 512GB PCIe NVMe Class 40 Solid State Drive
      i. Latitude 15 5000 Series Chassis Options: Latitude 15 5000 5511 Series Bottom Door L10
      j. Memory: 4GB (1x4GB) 1600MHz DDR3L Memory16GB, 1x16GB, DDR4 Non-ECC
      k. Internal Keyboard: Internal English Single Pointing Keyboard Dual Pointing US English Keyboard Backlit with 10 Key Numeric Keypad
      l. Optical Drive: 8X DVD+/-RW
      m. Wireless Driver: Intel® Dual Band Wireless-AC 7260 + BT 4.0 Driver Intel Wi-Fi 6AX201 2x2 802.11ax 160MHz + Bluetooth 5.1
      n. Wireless: Intel® Dual Band Wireless-AC 7260 802.11AC Wi-Fi + BT 4.0LE Half Mini Card
      o. Non-Microsoft Application Software: Additional Software for Window 7 Downgrade
      p. Power Supply: 65W A/C Adapter (3-pin)
      q. Camera: Light Sensitive Webcam and Noise Cancelling Digital Array Mic
      r. LCD Display: 15.6" FHD (1366x768)1920 x 1080) Wide View Anti-Glare WLED backlit Non-Touch, RGB Cam & Mic, WLAN/WWAN Capable
      s. Palmrest: No Fingerprint Reader (Single Pointing) Palmrest
      t. FGA Module: Alpine15_R1_106/US/BTS
      u. Provide for each laptop G-data total protection for duration of project."
   2. One (1) printer, scanner and fax machine with 8½ x 11, 8½ x 14 and 11 x 17 double sided capability as manufactured by Canon, ImageClass MF7480 or equal.
   3. One (1) point-and-shoot digital camera with zoom capabilities and two 4GB memory cards, manufactured by Canon, Powershot ELPH 180 or equal.

4. One (1) portable tablet computer with a minimum of 64 GB of storage, camera and Wi-Fi connectivity, iPad Mini as manufactured by Apple, or equal.
5. Two (2) 23-gallon plastic wastepaper basket.
6. One large set of triangles, an engineer's scale and an architect's scale.
7. New 50-person industrial first aid station, OSHA approved, by Acme United or equal, order no. ACM-1403 (Huntington Business Products) or equal.
8. Thermometer, with indoor and outdoor sensing bulbs, and high, low instantaneous reading, with magnetic reset function by Radio Shack or equal.
9. Infrared thermometer, Extech Model #42509.
10. Two U.L. and F.M. approved fire extinguishers with a minimum rating of 4A-60B:C.
11. Two (2) 30 inch x 60 inch desks with 4 side drawers and a locking center drawer.
12. Two (2) new swivel task chairs for use with desk equal to order no. SUP-12223643 by Superior Chair (Huntington Business Products).
13. One (1) new rolling stand with top, Model No. 76MR/76TP from Plan Hold, catalog #27, or equal.
14. One (1) 30-inch x 72-inch folding table.
15. Four (4) metal folding chairs.
16. One (1) adjustable, heavy-duty three-hole punch, by Master, order no. MAT-1340PB (Huntington Business Products or equal).
17. One (1) 40 sheet capacity heavy-duty two-hole punch, by Master, order no. MAT-327B or equal.
18. One (1) 2-foot x 4-foot cork bulletin board with wall mounting hardware.
19. One (1) 2-foot x 4-foot white board with wall mounting hardware and dry erase marker set
20. One (1) 3-foot x 3.5-foot high metal book shelf
21. One (1) four (4) drawer, legal size, fireproof filing cabinets with lock and keys, Global Business Furniture Catalog No. F4053, or equal. Provide with legal size hangers and with 60 legal size-hanging folders all the same color.
22. Bottled water service with water cooler and hot water dispenser.
23. 6 cubic foot refrigerator with separate freezer section.
24. Boot brush at each trailer staircases.
25. Mud mat at each trailer doorway.
26. Three (3) legal size clipboards.
27. Five (5) coat hooks or coat rack.
28. Three (3) Surge protection power strips, five receptacles minimum each.
29. Chair mat for each desk area.
30. One (1) 12-inch diameter battery operated wall clock.
31. Two (2) battery back-up units for desk top computer system: CyberPower Intelligent LCD Battery Backup, 825VA/450 Watts
32. Five (5) extension cords, minimum three plug each, three prong type
33. One (1) 10/100 Ethernet router with at least 4 Smith Ports.

B. Provide janitorial services two (2) times each week. Thoroughly clean and dust entire office and leave in a condition satisfactory to Owner. Remove and dispose of trash. Provide this service through final completion.

C. All items to be provided by Contractor under this paragraph shall remain the property of the Owner unless otherwise stated.

D. All items shall be delivered prior to the first application for payment, but no later than the day the Engineer's Trailer is delivered.

E. Engineer's Field Trailer:
   1. Office – Furnish, equip, and maintain a field office at the site for the exclusive use of Owner/Engineer.
      a. The field office shall be of substantial weatherproof construction, with a usable floor space of not less than 8 feet x 20 feet box size, with bathroom.

b. Office may be in an approved, near new condition, independent trailer, complete with insulated skirt and with sufficient non-skid metal landings and stairs at each door.
c. Submit a scaled floor plan of the trailer.

2. Duration - Provide office by no later than 30 calendar days from the date of the Notice to Proceed and maintained during the duration of the Contract, up to the date of the Final Certificate.
3. Location - As directed by Owner/Engineer. Relocate during the progress of the work, without additional cost to Owner, as may be required by the Owner/Engineer.
4. Utilities - Provide the following in sufficient size, quantity, and capacity, as approved by the Owner/Engineer.
   a. Windows for natural light and ventilation, with locks, screens, and shades or curtains.
   b. LED lighting acceptable to the Owner/Engineer.
   c. Door with hasp and padlock and five keys for Owner/Engineer's use. Provide two (2) commercial grade foot mats at each door.
   d. Air conditioning unit and heater in each room, sized to maintain an indoor temperature of 60 degrees F with an outdoor temperature range of 10 deg. F to 90 degrees F.
   e. 110 volts, 100-amp electric service with sufficient receptacles spaced around the room.

2.03 - TELEPHONE SERVICE

A. Provide on-site telephone line and service and answering machine in Engineers field trailer.

2.04 - INTERNET SERVICE

A. Provide high-speed internet access to computer to be used by Owner and Engineer.

2.05 – WATER SERVICE

A. Provide a water service with backflow prevention and freeze protection in accordance with water utility and health department requirements to serve plumbing fixtures in trailer.

2.06 – WASTEWATER DISPOSAL

A. Provide a sewer connection or wastewater holding tank with freeze protection below trailer if trailer provided with bathroom.

B. If wastewater holding tank utilized, provide pump out service to maintain holding tank.

2.07 - REMOVALS

A. Remove all items provided under this Section except as otherwise specified.

PART 3 – EXECUTION

3.01 - REMOVAL OF UTILITIES, FACILITIES AND CONTROLS

A. Remove temporary above grade or buried utilities, equipment, facilities and materials.

B. Remove underground installations to a minimum depth of 2 feet or as specified elsewhere.

C. Regrade area to existing slope and elevation and restore the surface to its existing condition or to the condition shown on the Contract Drawings.

D. Inventory all equipment that has been turned back to the Contractor prior to agreeing to final payment.

END OF SECTION 015213

SECTION 015714 – TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 – GENERAL

1.01 GENERAL

A. Provide and maintain methods, equipment, and temporary construction, as necessary to provide controls over environmental conditions at the construction site and adjacent areas. Remove physical evidence of temporary facilities at completion of Work.

1.02 NOISE CONTROL

A. Contractor's vehicles and equipment shall be such as to minimize noise to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards and in no case will noise levels be permitted which interfere with the Work of the County or others.

1.03 DUST CONTROL

A. The Contractor shall be responsible for controlling objectionable dust caused by his operation of vehicles and equipment, clearing or for any reason whatever, in accordance with the General Conditions Article GC-25, "Dust Control and Spillage."

1.04 PEST AND RODENT CONTROL

A. Provide rodent and pest control as necessary to prevent infestation of construction or storage area.
   1. Employ methods and use materials, which will not adversely affect conditions at the Site or on adjoining properties.

B. Provide seals in accordance with the General Conditions, Article GC-26, "Vermin Control."

1.05 WATER CONTROL

A. Provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the Site, or adjoining properties.
   1. Control fill, grading and ditching to direct water away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff courses so as to prevent any erosion, damage or nuisance.

B. Provide, operate and maintain equipment and facilities of adequate size to control surface water.

C. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the Site or to adjoining areas and in conformance with all environmental requirements.

D. All work must conform to the Storm Water Pollution Prevention Plan.

1.06 POLLUTION CONTROL

A. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.

B. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
   1. Excavate and dispose of any contaminated earth off-site, and replace with suitable compacted fill and topsoil.

C. Take special measures to prevent harmful substances from entering public waters.

1. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.

D. Provide systems for control of atmospheric pollutants.
   1. Prevent toxic concentrations of chemicals.
   2. Prevent harmful dispersal of pollutants into the atmosphere.

E. Contractor's equipment used during construction shall conform to all current federal, state and local laws and regulations.

1.07 EROSION CONTROL

A. Plan and execute construction work and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
   1. Hold the areas of bare soil exposed at one time to a minimum.
   2. Provide temporary control measures such as berms, dikes and drains.

B. Construct fills and waste areas by selective placement to eliminate surface silts or clays which will erode.

C. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

D. Conduct inspections at least weekly and after precipitation events as provided in the Stormwater Pollution Prevention Plan (SWPPP).

1.08 HAZARDOUS MATERIALS CONTROL

A. Refer to Section 013543, Environmental Procedures.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 015721 – SPILL PREVENTION AND CONTROL

PART 1 – GENERAL

1.01 DESCRIPTION

A. This section covers the Contractor's responsibilities with respect to spill prevention and control.

B. References: Where conflicts arise between requirements of the above-listed regulatory requirements, the most restrictive of the requirements shall be followed.
   1. USEPA Remedial Action at Waste Disposal sites EPA/625/6-B5/006
   2. 40 CFR Part 300 National Oil and Hazardous Substances Pollution Contingency Plan
   3. 40 CFR Protection of Environment
   4. ASTM E119 Fire Resistance Directory

1.02 SUBMITTALS

A. Submit Spill Prevention and Control Plan to the Engineer.

1.03 GENERAL REQUIREMENTS

A. Prepare and implement a Spill Prevention and Control Plan and maintain appropriate containment and/or diversionary structures, materials and equipment to prevent and control the maximum spillage of any specific item within the Scope of Work. All materials and equipment used in connection with this project shall be included. The plan shall include inspection and test procedures performed to ensure compliance.

B. Laws and Regulations: The Contractor shall not pollute any area with any manmade or natural harmful materials. It is the sole responsibility of the Contractor to investigate and comply with all applicable Federal, State, County and municipal laws and regulations concerning the Spill Prevention and Control Plan.

C. Include a Project Telephone Directory in the plan.

D. Written Discussions: In addition to the minimal prevention standards listed, the Plan shall include a complete discussion of conformance with the following applicable guidelines, other effective spill prevention and containment procedures, or if more stringent, with the State rules, regulations and guidelines.
   1. Facility Drainage
   2. Bulk Storage
   3. Facility Transfer operations, pumping, and conveying materials
   4. Truck loading/unloading rack

E. Design and Specifications: The Contractor shall provide for information only a site specific Spill Prevention and Control Plan with the following designs and specifications:
   1. Appropriate containment and/or diversionary structures or equipment to prevent discharge of materials to the environment
   2. Dikes sufficiently impervious to contain spill materials
   3. Curbing
   4. Culverts, gutters, or other drainage systems
   5. Weirs, booms, or other barriers
   6. Sorbent materials
   7. Curbing drip pans
   8. Sumps and collection systems

F. Inspections and Records: Inspections required by this Scope of Work shall be in accordance with written procedures developed for the facility of the Contractor. These written procedures and a record of the inspections, signed by the appropriate supervisor or inspector, shall be part of the Spill Control and Prevention Plan, and shall be maintained during the project and submitted to the Engineer for final closeout.

G. Facility Lighting: Facility lighting shall be commensurate with the type and location of the facility. Consideration shall be given to the following:
   1. Discovery of spills, occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (security personnel, the general public, local police, etc.)
   2. Prevention of spills occurring through acts of vandalism.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION

3.01 GENERAL

A. If materials are released, provide a written description of the event, corrective action taken, and plans for preventing a recurrence, as well as a written commitment of manpower, equipment, and materials required to expedite control and removal of any harmful quantity of materials released.

B. Notify the New York State Department of Environmental Conservation, Nassau County Department of Health, Nassau County Department of Public Works, and the Engineer within two hours of the release or spill.

3.02 TRAINING

A. Personnel Training and Spill Prevention Procedures: The Contractor shall be responsible for properly instructing his personnel regarding applicable pollution control laws, rules, and regulations; and in the operation and maintenance of equipment to prevent the discharge of materials.

B. Briefings: The Contractor shall schedule and conduct Spill Prevention Briefings for its operating personnel at intervals frequent enough to assure adequate understanding of the Spill Prevention and Control Plan for this project. Such briefings shall highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.

C. Evacuation Routes shall be marked on the project site.

3.03 TESTING

A. Facility communication or alarm systems and spill control equipment must be tested and maintained by the Contractor as necessary to assure proper operation in time of emergency.

END OF SECTION

SECTION 015813 – TEMPORARY PROJECT SIGNAGE

PART 1 – GENERAL

1.01 - SECTION INCLUDES

A. Fabrication and installation of a project identification sign for projects receiving funding through the New York Clean Water State Revolving Fund Program (CWSRF).

1.02 - REFERENCES

A. Lumber Standard: American Softwood Lumber Standard; U.S. Department of Commerce Product Standard PS1.

B. Softwood Plywood Standard: Construction and Industrial; U.S. Department of Commerce Product Standard PS1.

1.03 - SUBMITTALS

A. Submit under provision of Section 013300.

B. Submit proof sheet of sign.

C. Color samples: match specified colors.

1.04 – QUALITY ASSURANCE

A. Painter's Qualifications: Sign shall be prepared by a professional sign painter.

PART 2 – PRODUCTS

2.01 – MATERIALS

A. Framing and Posts: Standard Grade Douglas Fir, Hem-Fir, White Pine or Southern Pine: S4S; preservative treated.

B. Sign Panel: 3/4-inch APA rated, A-B grade exterior plywood rabbeted into a 2" x 4" nominal frame or other suitable materials and construction capable of withstanding typical weather conditions common to the project site.

C. Sign: Aluminum blank sign board with vinyl sheeting. Panel material shall be either Aluminum Alloy 6061-T6, 5154-H38 or 5052-H38.

D. Type: Caslon 540 with the exception of the logotype.

E. Select finishes to withstand weathering, fading and chipping for duration of sign placement.

F. Fasteners: Type 316 stainless steel.

2.02 – FABRICATION

A. Sign and structure shall be designed, supported and braced to remain in the proper positioning and alignment to withstand 115 mile per hour wind velocity.

B. Prepare surface of aluminum sign board before application of vinyl sheeting. The board shall not be handled between the cleaning operation and application of sheeting except by device or clean canvas gloves.

C. Cover aluminum blanks with vinyl sheeting to achieve background color.

D. Apply sheeting to the aluminum panel by the vacuum application process or mechanical process in accordance with the recommendations of the sheeting manufacturer.

E. Silk screen copy and logo on this surface.

F. For projects with more than one funding source the information specified for CWSRF projects may be combined with other project signage requirements onto one sign, as allowed and approved by the funding agencies. The size and spacing of the lettering on the sign may change to accommodate the addition of other funding agencies.

PART 3 - EXECUTION

3.01 - INSTALLATION

A. Sign shall be fabricated and in place within 21 days following the Notice to Proceed. Maintain sign through completion of construction and the Owner's acceptance of the work.

B. Set posts plumb, 4 feet minimum into the ground.

C. Embed posts in concrete and compact. Posts shall be painted white.

D. Fasten sign in a level position securely to posts with heavy-duty Type 316 stainless steel fasteners. Provide at least three (3) equally spaced lag bolts into each post.

E. Provide bracing between posts.

F. Install bottom of the sign panel a minimum of five feet above existing grade.

3.02 – PROTECTION

A. Maintain the sign clean, plumb, and level throughout the duration of the contract.

B. Repair deterioration and damage.

C. Remove sign after the Owner's acceptance of the work. Sign shall remain property of the Contractor. Fill post holes when sign is removed.

END OF SECTION

SECTION 016500 – PRODUCT DELIVERY REQUIREMENTS

PART 1 – GENERAL

1.01 GENERAL

A. Make all arrangements for transportation, delivery and handling of equipment and materials required for prosecution and completion of the Work.

B. Shipments of materials to the Contractor or Subcontractors shall be delivered to the Site only during regular working hours. Shipments shall be addressed and consigned to the proper party-giving name of the Project, street number and city. Shipments shall not be delivered to the County except where otherwise directed.

C. If necessary to move stored materials and equipment during construction, the Contractor shall move or cause to be moved materials and equipment without any additional compensation.

1.02 DELIVERY

A. Arrange deliveries of products in accordance with construction schedules and in ample time to facilitate inspection prior to installation.

B. Coordinate deliveries to avoid conflict with Work and conditions at site and to accommodate the following:
   1. Work of other contractors, or the County.
   2. Limitations of storage space.
   3. Availability of equipment and personnel for handling products.
   4. County's use of premises.

C. Do not have products delivered to the Project Site until related Shop Drawings have been approved by the Engineer.

D. Do not have products delivered to the Site until required storage facilities have been provided.

E. Have products delivered to the Site in manufacturer's original, unopened, labeled containers. Keep the Engineer informed of delivery of all equipment to be incorporated in the Work.

F. Partial deliveries of component parts of equipment shall be clearly marked to identify the equipment, to permit easy accumulation of parts and to facilitate assembly.

G. Immediately on delivery, inspect shipment to assure:
   1. Product complies with requirements of the Contract Documents and reviewed submittals.
   2. Quantities are correct.
   3. Containers and packages are intact, labels are legible.
   4. Products are properly protected and undamaged.

1.03 PRODUCT HANDLING

A. Provide equipment and personnel necessary to handle products by methods to prevent soiling or damage to products or packaging.

B. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.

C. Handle products by methods to prevent bending or overstressing.

D. Lift heavy components only at designated lifting points.

E. Materials and equipment shall at all times be handled in a safe manner and as recommended by manufacturer or supplier so that no damage will occur to them. Do not drop, roll, or skid products off from delivery vehicles. Hand carry or use suitable materials handling equipment.

1.04 REMOVING, HAULING, AND INSTALLING EQUIPMENT AND MATERIALS

A. The Contractor shall inspect all items including all boxes, crates and packages containing equipment and materials for damage that may have occurred during shipment prior to its removal from the truck or other conveyance. Any damage shall immediately be reported to the Engineer. The Contractor shall then carefully remove the equipment and materials from the truck or trucks on which it is shipped. The equipment and materials shall then be transported to the place of installation at the job Site. The Contractor shall be liable for loss or damage that the equipment and materials may receive while being unloaded, transported, stored or installed. The Contractor shall employ competent mechanics experienced in the installation of the types of equipment and materials to be furnished, and shall ensure that all equipment and materials are installed in accordance with the recommendations of the manufacturer. Bolts, nuts and other fastenings shall be furnished by the Contractor, and shall comply with the applicable requirements as specified. Equipment that arrives at the job site during normal working hours shall be unloaded as soon as practicable.

1.05 COORDINATE STORAGE AND INSTALLATION

A. The Contractor shall coordinate storage and installation of new equipment with construction schedule for existing and new structures.

1.06 CONTRACTOR'S USE OF COUNTY LIFTING EQUIPMENT

A. The Contractor shall not be permitted to use any existing lifting equipment at County facilities unless the following procedure is followed:
   1. Contractor shall employ the services of a qualified representative of the lifting equipment manufacturer to inspect all equipment. The manufacturer shall certify that said equipment is in safe operating condition and meets the rated load capacities. The County makes no claim that any existing lifting equipment is in operable condition or meets the requirements of the Contractor. All costs for inspections, certifications and repairs shall be the responsibility of the Contractor.
   2. Upon submittal of the required certifications and receipt of written authorization from the County, the Contractor will assume full responsibility for the operation, maintenance and regular inspection of the lifting equipment for the duration of his work.
   3. Upon completion of his work, the Contractor shall employ the services of a qualified representative of the lifting equipment manufacturer to re-inspect the equipment. The manufacturer shall recertify that said equipment is in safe operating conditions. All costs for inspections, certifications and repairs shall be the responsibility of the Contractor.
   4. Upon submittal of the required certifications and acceptance by the County, the County will resume responsibility for the equipment.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 – GENERAL

1.01 GENERAL

A. Furnish and Install:
   1. Where the words "furnish", "provide", "supply", "replace" or "install" are used, whether singly or in combination, they shall mean to furnish and install, unless specifically stated otherwise.
   2. In the interest of brevity, the explicit direction "to furnish and install" has sometimes been omitted in specifying materials and/or equipment. Unless specifically noted otherwise, it shall be understood that all equipment and/or materials specified or shown on the Drawings shall be furnished and installed under the Contract as designated on the Drawings.

B. Concrete Work
   1. Contractor, unless specifically noted otherwise, shall provide all concrete shown, specified, or required under this Contract.

C. Contractor's Title to Materials:
   1. No materials or supplies for the Work shall be purchased by the Contractor or by any Subcontractor subject to any chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller. The Contractor warrants that he has good title to all materials and supplies used by him in the Work, free from all liens, claims or encumbrances.

1.02 TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT

A. Make all arrangements for transportation, delivery and handling of equipment and materials required for prosecution and completion of the Work in accordance with Section 016500, Product Delivery Requirements.

1.03 STORAGE OF EQUIPMENT AND MATERIALS

A. Store equipment and materials at the job Site in accordance with the requirements of the General Conditions, Article GC-17, "Materials and Equipment, Approvals Substitutions and Deviations", and as hereinafter specified. All equipment and materials shall be stored in accordance with manufacturer's recommendations and as directed by the Engineer, and in conformity to applicable statues, ordinances, regulations, and rulings of the public authority having jurisdiction.

B. The Contractor shall enforce the instructions of the County and the Engineer regarding the posting of regulatory signs for loading on structures, fire safety and smoking areas.

C. Do not store materials or encroach upon private property without the written consent of the owners of such private property.

1.04 INSTALLATION OF EQUIPMENT

A. Install equipment and materials in accordance with the requirements of the General Conditions, Article GC-17, "Materials and Equipment, Approvals, Substitutions and Deviations".

B. Set, align, and assemble equipment in conformance with manufacturer's drawings or instructions. Runout tolerances by dial indicator method of alignment shall be plus or minus 0.002 inches, unless otherwise directed by the Engineer.

C. Blocking, wedges, shims, filling pieces, or other materials required by the proper support and leveling of equipment during installation shall be furnished by the Contractor. All temporary supports shall be removed, except steel wedges and shims, which may be left in place with the

approval of the Engineer. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the Contractor.

D. Provide anchor and expansion bolts, as specified, and required. Expansion bolts shall only be used where permitted by the Engineer. Anchor and expansion bolts shall be of Type 304 stainless steel unless otherwise specified. Anchorage items shall conform to the applicable requirements of Section 055000.

E. Workmanship:
   1. The following erection Specifications are not intended to cover all instructions, but only some of the important practices. In all cases, only the best methods known to the trades are to be employed.
   2. Only those mechanics skilled in the handling, setting, alignment, leveling and adjustment of the type of equipment materials supplied shall be employed in the Work.
   3. An oil bath heater shall always be used to expand couplings, gears, etc. They shall not be forced or driven on equipment shafts, nor shall they be subjected to an open flame or torch.
   4. Wedging will not be permitted. Only the least number of flat shims are to be used in leveling equipment (shims are to be clean and free of slag). All shims, filling pieces, keys packing, red or white lead grout, or other materials necessary to properly align, level and secure apparatus in place shall be furnished by the Contractor. All parts intended to be plumb or level must be proven exactly so. Any grinding necessary to bring parts to proper bearing after erection shall be done at the expense of the Contractor.
   5. Proper tools shall be used in the assembly of equipment and materials to prevent marring the surface of shafts, nuts, and/or other parts.
   6. Connections requiring gaskets shall be tightened evenly all around to ensure uniform stress over the entire gasket area.
   7. No equipment and materials shall be altered or repaired, and no burning or welding will be permitted on any parts having machined surfaces, except by written permission of the Engineer.
   8. No rigging shall be done from any structure without the permission of the Engineer, and the Contractor shall be completely responsible for any damage to the structure due to his operations.
   9. Only such equipment and materials that will not damage the structure, equipment, or materials, shall be used on the Work.
   10. The Contractor shall be responsible for the exact alignment of equipment with associated piping and, under no circumstances, will "pipe springing" be allowed.
   11. Misaligned holes shall be reamed, as excessive driving of bolts or keys will not be permitted.
   12. Furnish and install all necessary plugs in lubrication holes to prevent entry of foreign material.

J. Alignment and Leveling:
   1. All couplings shall be aligned while the equipment is free from all external loads.
   2. Both angular and parallel alignment shall be checked, and the degree of misalignment shall be recorded and submitted to the Engineer.
   3. Dial indicators shall be used for the checking of angular and parallel alignment. During rotation of the half couplings in performance of this test, they shall be maintained in the same relative position, and the dial indicator readings shall be taken at the same place on the circumference of the coupling.
   4. Misalignment shall not exceed the manufacturer's tolerances.

K. Threaded Connections:
   1. A molybdenum disulfide anti-seize compound shall be applied to all threads in mechanical connections such as bolts, studs, cap screws, tubing, etc. unless otherwise indicated.

L. Lubrication:

1. All lubrication shall be performed by the Contractor before start-up, in accordance with the lubricant specifications and directions furnished by the manufacturer. The Contractor shall furnish the lubricants.

M. Electrical Connections:
   1. Electrical connections shall be provided in accordance with the applicable requirements of Division 26, Electrical.

N. Painting:
   1. All equipment and materials, unless specified otherwise, shall be field painted in accordance with the requirements of the Technical Specifications.

O. Testing:
   1. The Contractor shall carry out all checking and/or testing of installed equipment in accordance with manufacturer's specifications, and as required by the Engineer.

P. Maintenance of Installed Equipment:
   1. During the time between installation and receipt of the certificate of completion, the Contractor shall maintain all equipment in accordance with the equipment manufacturer's instructions and with the approval of the Engineer.

Q. Services of Manufacturer's Representatives:
   1. Equipment furnished under Divisions 2 through 16 shall include the cost of a representative of the manufacturers of all equipment as specified in the General Conditions, Article GC-17, "Materials and Equipment, Approvals, Substitutions and Deviations".
   2. Detailed Specifications contain additional requirements for furnishing the services of the manufacturer's representatives.
   3. A certificate from the manufacturer stating that the installation of the equipment is satisfactory, that the unit has been satisfactorily tested and is ready for operation, and that the operating personnel have been suitably instructed in the operation, lubrication and care of the unit shall be submitted within thirty days of completion f the performance test.

1.05 CONNECTIONS TO EQUIPMENT

A. Connections to equipment shall follow manufacturer's recommendations as to size and arrangement of connections and/or as shown in detail on the Drawings or approved Shop Drawings. Piping connections shall be made to permit ready disconnection of equipment with minimum disturbance of adjoining piping and equipment. The Contractor shall be responsible for the exact alignment of equipment with associated piping and under no circumstances will pipe springing be allowed.

B. The Contractor shall be responsible for bringing proper electrical service to each item of equipment requiring electrical service as shown on the Drawings or approved Shop Drawings. Electrical connections to equipment requiring electrical service shall be made by the Contractor, unless otherwise indicated on the Drawings or in the Technical Specifications.

1.06 SUBSTITUTIONS

A. Requests for substitutions of equipment or materials shall conform to the requirements of the General Conditions, Article GC-17, "Materials and Equipment, Approvals, Substitutions and Deviations", and as hereinafter specified.
   1. The Contractor shall submit for each proposed substitution sufficient details, complete descriptive literature, and performance data together with Samples of the materials, where feasible, to enable the County to determine if the proposed substitution is equal.
   2. The Contractor shall submit certified tests, where applicable, by an independent laboratory attesting that the proposed substitution is equal.

3. A list of installations where the proposed substitution is in satisfactory operation.
4. Requests for substitutions shall include full information concerning differences in cost, and any savings in cost resulting from such substitutions shall be passed on to the County.

B. Where the approval of a substitution requires revision or redesign of any part of the Work, all such revision and redesign, and all new Drawings and details required therefore, shall be provided by the Contractor at his own cost and expense, and shall be subject to the approval of the County.

C. In the event that the Engineer or his consultants is required to provide additional services, the charges for such additional services shall be charged to the Contractor by the County in accordance with the requirements of the General Conditions, Article GC-18, "Contractor Costs for Engineering Services".

D. Any modifications in Work required under other Contracts, to accommodate the changed design, will be incorporated in the appropriate Contracts and any resulting increases in Contract prices will be deducted by the County from payments otherwise due by the Contractor who initiated the changed design.

E. In all cases the County shall be the judge as to whether a proposed substitution is to be approved. The Contractor shall abide by their decision when proposed substitute items are judged to be unacceptable and shall in such instances furnish the item specified or indicated. No substitute items shall be used in the Work without written approval of the County.

F. In making request for substitution, the Contractor represents that:
1. The Contractor has investigated proposed substitution, and determined that it is equal to or superior in all respects to the product, manufacturer or method specified.
2. The Contractor has verified that proposed substitution will coordinate with existing design.
3. The Contractor will provide the same or better warranties or bonds for proposed substitution as for product, manufacturer or method specified.
4. The Contractor waives all claims for additional costs or extension of time related to proposed substitution that subsequently may become apparent.

G. Proposed substitutions will not be accepted if:
1. Acceptance will require substantial revision of the Contract Documents.
2. They will change design concepts or Specifications.
3. They will delay completion of the Work, or the work of other contractors.
4. They are indicated or implied on a Shop Drawing and are not accompanied by a formal request for substitution from the Contractor.

H. Approval of a substitution will not relieve the Contractor from the requirement for submission of Shop Drawings as set forth in the Contract Documents.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 – GENERAL

1.01 GENERAL

A. The General Construction Contractor shall establish at least two benchmarks for use by all Contractors, in accordance with the General Conditions, Article GC 28, "Layout and Levels" and the Agreement, Article XXIX, "Character and Competency" and Article XXX, "Superintendence". The Contractor shall comply with this article.

B. Contractor shall:
   1. Provide civil, structural or other professional engineering services specified, or required to execute Contractor's construction methods.
   2. Develop and make all detail surveys and measurements needed for construction including slope stakes, batter boards, piling and pier layouts and all other working lines, elevations and cut sheets.
   3. Keep a transit and leveling instrument on the Site at all times and a skilled instrument man employed or obtained whenever necessary for layout of the Work.
   4. Provide all material required for benchmarks, control points, batter boards, grade stakes, and other items.
   5. Be solely responsible for all locations, dimensions, and levels. No data other than written orders of the Engineer shall justify departure from the dimensions and levels required by the Drawings.
   6. When requested by Engineer, provide such facilities as may be necessary for the Engineer to check line and grade points placed by the Contractor. The Contractor shall do no excavation, backfill or embankment Work until all cross sectioning necessary for determining pay quantities has been completed and checked by the Engineer.

1.02 CONTRACTOR'S FIELD ENGINEER

A. The Contractor shall employ and retain at the Site of the Work a field engineer capable of performing all engineering tasks required of the Contractor. Tasks included are:
   1. A projection of Work to be completed the following day must be submitted to the Engineer by 4:00 PM of the preceding workday. This projection must include:
      a. Location of all areas in which construction will be done, including the Contractor and his Subcontractors.
      b. Major construction equipment utilized.
      c. Equipment and materials to be installed.
   2. Provide all surveying equipment required including transit, level, stakes and required surveying accessories.
   3. Furnish all required lines and grades for construction of operations. Check all formwork, reinforcing, inserts, structural steel, bolts, sleeves, piping, other materials and equipment.
   4. Maintain field office files and drawings, Record Drawings, and coordinate engineering services with Subcontractors. Prepare Layout and Coordination Drawings for construction operations.
   5. Check and coordinate Work for conflicts and interference and immediately advise the Engineer of all discrepancies noted.
   6. Cooperate with the Engineer in field inspections, as required

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. A qualified engineer or registered land surveyor, acceptable to the Engineer.

1.04 RECORDS

A. Maintain a complete, accurate log of all control and survey Work as it progresses.

B. On completion of foundation walls and major Site improvements, prepare a certified survey showing all dimensions, locations, angles and elevations of construction.

1.05 SUBMITTALS

A. When requested by the Engineer, submit a certificate signed by a registered Engineer or surveyor certifying that elevations and locations of Work are in conformance with the Contract Documents. Explain all deviations.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 017399– CUTTING AND PATCHING

PART 1 – GENERAL

1.01 GENERAL

A. This Section is supplementary to the requirements of the General Conditions, Article GC-29, "Cutting and Patching" and includes all cutting and patching of all Work under construction, completed Work and facilities installed by others, in order to accommodate the coordination of Work, install other Work, uncover Work for access, inspection or testing, or similar purposes. Demolition, removals, and modifications work is specified in Section 024119, Selective Demolition. Execute all cutting and patching, including excavation, backfill and fitting required to:
   1. Remove and replace defective Work or Work not conforming to requirements of the Contract Documents.
   2. Remove samples of installed Work as required for testing.
   3. Remove all constructions required to provide for specified alteration or addition to Work by others.
   4. Uncover Work to provide for the Engineer's inspection of covered Work or inspection by regulatory agencies having jurisdiction.
   5. Connect to completed Work that was not accomplished in the proper sequence.
   6. Remove or relocate utilities and pipes installed by others which obstruct the Work to which connections must be made.
   7. Make connections or alterations to new facilities or facilities installed by others.

B. Restore all Work by others to a state equal to that which it was in prior to cutting and restore new Work to the standards of these Specifications.

C. Submittals:
   1. Prior to cutting, which may affect the integrity and design function of the Project, County's operations, or Work of another Contractor, submit written notice to the Engineer, requesting consent to proceed with cutting, including:
      a. Identification of the Project.
      b. Description of affected Work of Contractor and Work of others.
      c. Necessity for cutting.
      d. Effect on other Work and on structural integrity of the Project.
      e. Description of proposed Work. Designate:
         1) Scope of cutting and patching.
         2) Contractor, Subcontractor or trade to execute Work.
         3) Products proposed to be used.
         4) Extent of refinishing.
         5) Schedule of operations.
      f. Alternatives to cutting and patching, if any.
      g. Designation of party responsible for cost of cutting and patching.
   2. Should conditions of Work, or schedule, indicate change of materials or methods, submit written recommendation to the Engineer, including:
      a. Conditions indicating change.
      b. Recommendations for alternative materials or methods.
      c. Submittals as required for substitutions.
   3. Submit written notice to the Engineer, designating the time Work will be uncovered, to provide for observation. Do not begin cutting or patching operations until authorized by the Engineer.

D. Provide shoring, bracing and support as required to maintain structural integrity of the Project and protect adjacent Work from damage during cutting and patching.

E. Conform to all applicable Specifications for application and installation of materials used for patching.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for construction waste management.

1.02 SUBMITTALS

A. The Contractor shall prepare and submit a Construction Waste Management Plan for review and approval by the Engineer within fifteen (15) days after receipt of Notice to Proceed and prior to the removal of any construction waste or demolition materials from the Project site.

B. The Construction Waste Management Plan shall contain the following:
   1. Analysis of the proposed job site waste to be generated during the full construction period, including types and anticipated quantities of each. The list of construction waste materials shall include, at a minimum but not limited to, the following materials:
      a. Cardboard
      b. Clean dimensional wood
      c. Demolition debris
      d. Concrete
      e. Bricks
      f. Concrete masonry units (CMU)
      g. Asphalt
      h. Metals from rebar, sheetrock studs, framing, etc.
      i. Steel sheet piling
      j. Steel pipe piles
      k. Structural steel
      l. Paints, solvents, and other hazardous fluids
      m. Glass
      n. Roofing
      o. Wood pallets
      p. Fencing materials
      q. Mercury containing light bulbs/batteries
      r. Recyclable office wastes such as paper and toner and ink cartridges that should be recycled.
   2. Materials Handling Procedures: A description of the means by which any construction waste materials listed above will be appropriately segregated and not mixed in order to prevent cross-contamination as well as a description of the means to be employed in recycling the above materials consistent with requirements of the County.
   3. The Construction Waste Management Plan shall specify a list of waste transporters, transfer stations, disposal facilities and recyclers with addresses, phone numbers, and permits which the Contractor intends to utilize during the construction period for the purpose of complying with the Construction Waste Management Plan. The Plan should list where the non-recyclable materials will be disposed.
   4. Transportation: A description of the means of transportation of the recyclable and non-recyclable materials (whether materials will be site-separated and self- hauled to designated centers, or whether mixed materials will be collected by a waste transporter and removed from the site) and destination of such materials.
   5. Hazardous wastes: The Construction Waste Management Plan shall specifically note the proper method of disposal for anticipated hazardous wastes or potentially hazardous wastes such as resins, epoxies, waterproofing agents, waste paints, solvents, and other hazardous fluids, expended 55 gallon drums, concrete curing compounds, etc. The Plan shall state that the hazardous waste transporter must hold a current NYSDEC Part 364 Waste Transporter Permit. The permit must authorize the transporter to take the hazardous

waste to the Transportation, Storage and Disposal Facility (TSDF) identified in the permit. The Construction Waste Management Plan must state that the hazardous waste will be transported in compliance with USDOT 49 CFR Hazardous Materials Transportation regulations.

6. Universal wastes: The Construction Waste Management Plan shall specifically identify the proper method of handling of universal wastes (e.g., mercury containing bulbs, batteries). Universal wastes must be managed in compliance with 6NYCRR Part 374-3 and with USDOT 49 CFR Hazardous Materials Transportation regulations.
7. Non-hazardous wastes: The Construction Waste Management Plan shall specifically note the proper method of disposal of anticipated non-hazardous waste such as oily rags. The Plan shall state the transporter must hold a current Part 364 Waste Transporter Permit to transport the waste to a TSDF that accepts non-hazardous waste.
8. The Construction Waste Management Plan shall include the method of recycling office materials such as clean white paper, mixed paper, toner cartridges for laser printers, copiers, and fax machines. Each item shall be recycled in accordance with the manufacturer's instructions.
9. The Construction Waste Management Plan shall include the coordination of product deliveries to designated prepared areas in order to minimize site storage time and potential damage to stored materials and the return of packing materials, such as wood pallets, fifty-five (55)-gallon drums, etc., where economically feasible.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONSTRUCTION WASTE MANAGEMENT

A. The Contractor shall use construction and demolition methods and processes to ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors. Where economically feasible, as many of the materials from the generated waste shall be salvaged, reused, or recycled.

B. When encountered as part of his work, the Contractor shall dispose of construction and demolition waste by recycling methods in accordance with all relevant State, County and local codes, laws, and regulations.

C. All hazardous waste, universal waste, and used oil must be separated and stored in their own dedicated storage areas and managed in compliance with NYSDEC Hazardous Waste, Universal Waste and Used Oil Regulations and USDOT 49 CFR Hazardous Material Transportation Regulations.

3.02 HANDLING AND STORAGE

A. The Contractor shall designate separate receiving/storage areas for delivered materials and equipment to minimize waste due to excessive materials mishandling, misapplication, weather, and other damage.

B. The requirements herein shall supersede any conflicting statements wherever they may appear in the Contract Documents.

END OF SECTION

SECTION 017423 – CLEANING

PART 1 – GENERAL

1.01 GENERAL

A. Execute cleaning, during progress of the Work, at completion of the Work, and as required by the General Conditions, Article GC-33, "Cleaning".

B. Requirements of Regulatory Agencies:
   1. In addition to the requirements herein, maintain the cleanliness of the Work and surrounding premises within the Work limits so as to comply with federal, state, and local fire and safety laws, ordinances, codes and regulations.
   2. Comply with all federal, state and local anti-pollution laws, ordinances, codes and regulations when disposing of waste materials, debris and rubbish.

C. Scheduling of Cleaning and Disposal Operations:
   1. So that dust, wash water or other contaminants generated during such operations do not damage or mar painted or finished surfaces.
   2. To prevent accumulation of dust, dirt, debris, rubbish and waste materials on or within the Work or on the premises surrounding the Work.

D. Waste Disposal:
   1. Dispose of all waste materials, surplus materials, debris and rubbish off the plant Site.
   2. Do not burn or bury rubbish and waste materials on the plant Site.
   3. Do not dispose of volatile or hazardous wastes such as mineral spirits, oil, or paint thinner in storm or sanitary drains.
   4. Do not discharge wastes into streams or waterways.

E. Cleaning Materials:
   1. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
   2. Use each type of cleaning material on only those surfaces recommended by the cleaning material manufacturer.
   3. Use only materials which will not create hazards to health or property.

F. During Construction:
   1. Keep the Work and surrounding premises within work limits free of accumulations of dirt, dust, waste materials, debris and rubbish, in accordance with the General Conditions, Article GC-33, "Cleaning."
   2. Keep dust generating areas wetted down.
   3. Provide suitable containers for storage of waste materials, debris and rubbish until time of disposal.
   4. Dispose of waste, debris and rubbish off Site at legal disposal areas.

G. When Project is Completed:
   1. The Contractor shall clean and maintain the Site in accordance with Division 1, Section 017700, Closeout Procedures.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 017516 – STARTUP PROCEDURES

PART 1 – GENERAL

1.01 GENERAL

A. Initially start up and place all equipment installed during the Contract work into successful operation according to manufacturers' written instructions and as instructed by manufacturers' field representatives. Provide all material, labor, tools, equipment, and expendables required.

B. General Activities Include:
   1. Cleaning.
   2. Removing temporary protective coatings.
   3. Flushing and replacing greases and lubricants, where required by manufacturer.
   4. Lubrication.
   5. Check and correct if necessary leveling plates, grout, bearing plates, anchor bolts, fasteners, and alignment of piping which may put stress on equipment connected to it.
   6. All adjustments required.

C. Provide initial filling of lubricants and all other required operating fluids.

D. Provide filters, chemicals, and other expendables required for initial startup of equipment unless otherwise specified.

1.02 MINIMUM START UP PROCEDURES

A. Valves:
   1. Inspect both hand and automatic control valves, clean bonnets, and stems.
   2. Tighten packing glands to assure no leakage, but permit valve stems to operate without galling.
   3. Replace packing in valves to retain maximum adjustment after system is judged complete.
   4. Replace packing on any valve which continues to leak.
   5. Remove and repair bonnets which leak.
   6. Coat packing gland threads and valve stems with a surface preparation of "Moly Cote" or "Fel Pro", after cleaning.

B. Verify that control valve seats are free from foreign material and are properly positioned for intended service.

C. Tighten all pipe joints after system has been tested.
   1. Replace gaskets which show any sign of leakage after tightening.

D. Inspect all joints for leakage.
   1. Promptly remake each joint which appears to be faulty, do not wait for rust to form.
   2. Clean threads on both parts, apply compound and remake joints.

E. After system has been tested, clean strainers, dirt pockets, orifices, valve seats and headers in fluid system, to assure freedom from foreign materials.

F. Open steam traps and air vents where used, remove operating elements.
   1. Clean thoroughly, replace internal parts and put back into operation.

G. Remove rust, scale and foreign materials from equipment and renew defaced surfaces.

H. Set and calibrate equipment.

I. Check each electrical control circuit to assure that operation complies with Specifications and requirements to provide desired performance.

J. Vent gasses trapped in any part of systems. Verify that liquids are drained from all parts of gas or air systems.

1.03 INITIAL FACILITIES START UP

A. Prior to startup of the plant facilities, prepare and pre-test all equipment to check its ability for sustained operation, including inspections and adjustments by manufacturer's service staff. Also, all training by vendors shall have begun and all O&M manual submittals shall be completed prior to start-up.

B. After the facilities are sufficiently complete to permit start up, the Contractor shall furnish competent personnel to start up the plant facilities. The Contractor will be responsible for startup of all facilities constructed under this Contract. During the initial startup period the Contractor shall check and provide for satisfactory mechanical operation of the plant facilities. Prior to start up, prepare a schedule detailing the proposed start up and his plans for personnel and auxiliary facilities to be provided. The startup schedule is subject to approval of the Engineer. Startup of the facilities by the Contractor shall include the operation and maintenance of all mechanical facilities and electrical systems. The start-up period shall be a minimum of ten (10) consecutive twenty-four (24)-hour days of satisfactory operation of the facility or the number of days called for in the Technical Specifications.

C. When the startup period is completed, the County will assume responsibility for operation of the new facilities, provided that all major items of the Work are operating satisfactorily and operation and maintenance training has been completed satisfactorily. If any or all of the new facilities are not operating satisfactorily at the end of the startup period, the Contractor shall continue to operate those facilities that are incomplete or not operating satisfactorily until they are complete and acceptable to the County.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 - GENERAL

1.01 - SUMMARY

A. Testing of piping.

B. Testing of tanks vented to atmosphere.

C. Pipe leakage testing shall comply with the conditions noted in the Schedule.

1.02 - DEFINITIONS

A. Leakage (or exfiltration) - The quantity of water to be supplied into the newly laid pipe, any valved section thereof, manhole, or other appurtenance, necessary to maintain the specified leakage test pressure after the pipe has been filled with water and the air expelled.

B. Infiltration - The quantity of water that enters into any pipe, manhole, or other appurtenance when the static groundwater elevation is at the maximum elevation above the pipe or appurtenance as specified hereinafter.

1.03 - QUALITY ASSURANCE

A. Prior to Substantial Completion, pressure pipes and non-pressure pipes shall meet specific leakage requirements. These leakage requirements shall be satisfied by the basic materials alone. Where joint fillers and the like have been specified, primarily to protect jointing materials, and secondarily to provide a factor of safety, they shall not be applied until after leakage tests have been completed and have been accepted by Engineer.

B. Engineer will witness all tests. Tests not witnessed will be considered as not having been performed.

C. Do not close or cover up work until it has been observed for proper and satisfactory construction and installation in compliance with the Contract Documents. Should incomplete or unacceptable work be covered, the Contractor shall, at his/her own expense, uncover all work so that it may be properly observed. After such observations, repair and replace the work that was found defective, unsatisfactory, and not in accordance with the Contract Documents. After such repair and replacement, bring all work to completeness and status as it was before it was closed and covered, all at the Contractor's own expense. Submit for review and approval proposed corrective action to correct failed systems.

D. Successful completion of required tests shall be in no way interpreted as relieving the Contractor of responsibility for defects that become apparent subsequent to the time of testing. It shall be the sole right of the Engineer to determine whether defects exist. Retest all portions of the work deemed necessary by the Engineer prior to Substantial Completion.

1.04 - SUBMITTALS

A. Submit under provisions of Section 013300.

B. Provide details and specifications on testing apparatus.

C. Provide certified test results on forms approved by the Engineer.

1.05 - SEQUENCING AND SCHEDULING

A. Notify Engineer and governing agencies, if necessary, at least 48 hours in advance of a scheduled test so that the test may be witnessed.

B. Test underground pipe prior to backfilling.

C. At Engineer's discretion, additional sections of pipelines may be required to be tested as soon as pipe is laid and prior to backfilling when working conditions or the standard of workmanship have been altered.

PART 2 - PRODUCTS

2.01 - TESTING APPARATUS

A. Provide labor, plugs, measuring equipment, and other apparatus, complete, to perform testing.

B. Provide clean water, air, nitrogen, and other materials as required to accomplish testing.

C. Provide plugs and caps capable of withstanding test pressures.

D. Provide temporary flanges, plugs, bulkheads, thrust blocks, weighing, bracing and other items necessary to prevent joints from separating, and to prevent injuries or damage.

PART 3 - EXECUTION

3.01 - PREPARATION

A. Plug open ends, adequately block bends, tees, ends, and other fittings, and do whatever is necessary to brace piping system so that it will safely withstand the pressures developed under the tests and so that no damage or injury shall occur to the pipeline, people or property.

B. Before tests are conducted, isolate, or remove any regulator, gauge, trap, or other apparatus or equipment that may be damaged by test pressures.

3.02 - GENERAL

A. Trapped Air: Trapped air may cause a false indication of the rate of leakage. Points of concern include ends of lines, stubs, house connections and high points in pipelines. No credit will be made for this condition and no adjustment will be made to the allowable leakage. When trapped air is suspected of causing a test failure, do whatever is necessary to evacuate the air and repeat tests until the actual leakage is equal to or less than allowable rate of leakage.

B. Water Absorption: No credit will be given for absorption of water in pipe and manhole walls. If necessary, fill pipes and manholes with water well in advance of testing and allow them to soak in order to eliminate or minimize the effects of absorption.

3.03 - TESTS FOR NON-PRESSURE PIPING

A. General:
   1. Leakage shall be determined by exfiltration testing. The Engineer reserves the right to also require infiltration testing.
   2. Air testing is not permitted.
   3. Leakage testing shall include the main non-pressure pipe, house connections, and appurtenances on the section of pipeline being tested.
   4. Limit pipeline test sections to runs between adjacent structures. Manholes may be tested simultaneously with pipes.
   5. Adequately plug ends of house connections, stubs, and openings from which water may escape.
   6. Use clean water for exfiltration tests.
   7. Determine groundwater levels by installing piezometers, test holes or test pits at intervals not to exceed 1,000 feet.

B. Pipe Exfiltration Test:
   1. The minimum water level required for testing is 4 feet above the crown of the upstream (highest) end of the pipe being tested or 2 feet above the maximum groundwater level along the test section, whichever is greater.
   2. Install a watertight plug in the downstream end of the manhole pipe.
   3. Fill upstream manhole with water and conduct test for six (6) hours.
   4. Upon satisfactorily completing the test, remove the downstream plug in the presence of Engineer. Do not touch nor remove anything until approved by Engineer.
   5. Maximum allowable exfiltration is one hundred (100) gallons per inch diameter per mile per day.

C. Pipe Infiltration Test:
   1. The minimum head of groundwater required for infiltration testing is 2 feet above the crown of the pipe at the upstream end but must in all cases reach its normal level.
   2. Infiltration may be measured with an approved graduated container capable of intercepting all inflow, by a pipeline V-notch weir, or by other approved methods. When using instream type measuring devices, do not measure flows until steady state conditions are established.
   3. Maximum allowable infiltration is one hundred (100) gallons per inch diameter per day per mile of pipe.
   4. Where groundwater level is at least 2 feet above the highest manhole joint, manholes may be included in the test. No visible leakage will be permitted in manholes.

3.04 - TESTS FOR PRESSURE PIPES

A. Leakage testing shall include the main exiting pipe, service connections, and other appurtenances on the section of pipeline being tested.

B. Test pipes prior to applying insulation and before they are concealed or furred-in.

C. Provide all necessary gauges. Gauges shall be standard pressure type with a minimum 6-inch diameter dial and a pressure range not in excess of 150% of the maximum required test pressure.

D. Provide and maintain at the site a gauge stand with an approved laboratory calibrated test gauge. Periodically check test gauge used for testing against the test gauge, and whenever requested by Engineer.

E. Where it is necessary for testing, tap pipes and insert approved plugs after testing is completed.

F. Provide a hand or motor driven compressor to maintain the required test pressure constant throughout the duration of the test. If a water pump is used, pump water from a container with a known volume of water. If an air or inert gas pump is used, leakage shall be determined and calculated by the cycling of the pump.

G. Provide test gauges at each end of the line being tested.

H. Conduct leakage test in accordance with the requirements contained in the Schedule.

3.05 - ALLOWABLE LEAKAGE

A. The maximum allowable leakage for the various piping systems is presented in the schedule.

B. It is the intent of this Contract to secure piping systems without leakage.
   1. Each section of pipe and within each structure shall not exceed the allowable leakage.
   2. It is also the intent to secure a piping system free from visible drips, streams and leaks. Therefore, even if a portion of the system meets the requirements for allowable leakage, visible leaks are not permitted and shall be repaired.

C. Leakage tests will be considered satisfactorily passed when the rate of leakage is equal to or less than the stipulated allowances, there is no evidence of visible leaks, and there is no evidence of other system defects.

3.06 – TEST FOR TANKS VENTED TO ATMOSPHERE

A. Prior to testing liquid holding tanks open to the atmosphere, backfill to finished grade. Piping and equipment within the tank that might affect the watertightness of the tank shall be completely installed and operable.

B. Isolate each individual tank for testing.
   1. Fill with clean, potable water to the maximum operating level.
   2. After a suitable stabilization period, the maximum operating level shall be reestablished and a twenty-four (24) hour leakage test shall be performed.
   3. During the test, no water shall be added to or taken from the tank. The drop in the water level shall be recorded at the end of the period.
   4. The allowable loss is no more than 1/4-inch per eight hours and no running leaks shall be visible.
   5. Leaks shall be repaired by methods and materials approved by the Engineer prior to the start of the corrective action.
   6. Leakage shall be corrected prior to the performance of equipment testing.
   7. During the testing of each individual tank, as outlined in this paragraph, all immediately adjacent tanks shall be empty of water.

C. After each individual tank has passed the leakage test, all tanks within each complex shall be filled with water to the normal operation level to check complex structural integrity and the hydraulics of operation.

3.07 - RETESTING

A. Pipes, tanks and manholes not passing the tests shall have all defects corrected with methods approved by the Engineer to the inspection and satisfaction of Engineer, and shall be retested and re-corrected as often as is necessary until the test requirements have been met.

B. It is the intent of this Contract to obtain work meeting test requirements on their own and solely through the use of the normal integral sealing components.
   1. Joint leaks shall not be stopped using concrete, caulking, mortar, or other patching materials.
   2. Leaking pipe joints shall be re-jointed and leaking manhole joints shall have joints reset, or replaced if necessary.

C. Methods other than rejoining, resetting or replacing joint seals shall require the written approval of Engineer.

3.08 - SCHEDULE

LEAKAGE TESTING REQUIREMENTS

SERVICE	FLUID	PRESSURE	DURATION (Hrs.)	ALLOWABLE LEAKAGE (Note 1)		
				UNDERGROUND		EXPOSED
				Infil.	Exfil.	
Non-Pressure Piping	Water	*4ft.*	6	100	100	None
Pressure Piping	Water	**(Note 2)**	**(Note 2)**	0	0	0

SCHEDULE NOTES:

1. Maximum allowable leakage in gallons/day/inch diameter per mile of pipe, or gallons/day/inch diameter/mile for manholes. Where a percentage is shown, the loss shall not exceed the percentage of the starting test pressure.

2. Maintain 100 psi or two times operating pressure, whichever is greater, for 2 hours.

END OF SECTION

SECTION 017700 – CLOSEOUT PROCEDURES

PART 1 – GENERAL

1.01 FINAL CLEANING

A. At the completion of the Work, the Contractor shall remove temporary structures, construction signs, tools, scaffolding, materials, supplies and equipment which he or any of his Subcontractors may have used in the performance of the Work.

B. The Contractor shall broom clean paved surfaces and rake clean other surfaces of grounds.

C. The Contractor shall thoroughly clean all materials, equipment and structures; all marred surfaces shall be touched up to match adjacent surfaces; dirty filters and burned-out lights replaced as required. The Contractor shall clean and polish all interior and exterior glass surfaces so as to leave glass surfaces in a clean and new appearing condition.

D. The Contractor shall remove spatter, grease, stains, fingerprints, dirt, dust, labels, tags, packing materials, rubbish, and other foreign items or substances from interior and exterior surfaces, equipment, signs and lettering.

E. Remove paint, clean and restore all equipment and material nameplates, labels and other identification markings.

F. The Contractor shall maintain cleaning until Project, or portion thereof, is occupied by the County.

1.02 INSPECTIONS

A. At the time of substantial completion an inspection shall be held in accordance with the requirements of the Agreement, Article XXXVI, "Substantial Completion Payment". At this time the Contractor shall also provide all necessary documentation as required by the above referenced Article.

B. At the time of completion of all the Work a final inspection shall be held in accordance with the requirements of the Agreement, Article XXXVII, "Final Payment". The Contractor shall also provide all necessary documentation as required by the above referenced Article, and comply with all the requirements of the General Conditions, Article GC-38, "Project Closeout".

C. Follow-up Inspection:
   1. At the time of the completion of the guarantee period as specified in the Agreement, Article XX, "Maintenance and Guarantee," the Engineer will make arrangements with the County and the Contractor for a follow-up inspection and will send a written notice to said parties to inform them of the date and time of the inspection.
   2. After the inspection, the Engineer will inform the Contractor of any corrections required.
   3. When the corrections have been satisfactorily completed, the Engineer will forward a certificate for the release of Bonds.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

PART 1 – GENERAL

1.01 GENERAL

A. Provide operation and maintenance data in the form of instructional manuals for use by the County's personnel for:
   1. All equipment and systems.
   2. All valves, gates, and related accessories.
   3. All instruments and control devices.
   4. All electrical gear.

1.02 LUBRICATION SURVEY

A. Provide a lubrication survey, made by a lubricant supply firm, subject to the approval of the Engineer, and paid for by the Contractor.

B. Lubrication survey shall list all equipment, the equipment manufacturer's lubrication recommendations, and an interchangeable lubricants tabulation standardizing and consolidating lubricants whenever possible. Include lubricant type, quantities, and frequencies for each piece of equipment.

C. The Contractor shall supply all lubricants, applicators, and labor for lubricating the equipment, in accordance with manufacturer's recommendations, for field-testing and prior to final acceptance. A supply of required lubricants sufficient for start-up and one year of operation shall also be supplied by the Contractor.

D. Four copies plus word and PDF files of the approved lubrication survey shall be furnished prior to final acceptance.

1.03 SPARE PARTS AND SPECIAL TOOLS

A. Spare Parts:
   1. As soon as practicable after approval of the list of equipment, the Contractor shall furnish spare parts data for each different item of equipment listed. The data shall include a complete list of parts and supplies, with current unit prices and source or sources of supply. This information shall also be included in the Operations and Maintenance Manuals.
   2. The Contractor shall also furnish a list of parts, and supplies that are either normally furnished at no extra cost with the purchase of the equipment, or specified to be furnished as part of the Contract and a list of additional items recommended by the manufacturer to assure efficient operation for the particular installation for a period of one year or the guarantee period, whichever is greater.
   3. All parts shall be securely boxed and tagged, and clearly marked on the box and individually for identification as to the name of manufacturer or supplier, applicable equipment, part number, description, and location in the equipment. All parts shall be protected and packaged for a shelf life of at least ten years.

B. Special Tools:
   1. The Contractor shall furnish at no additional cost to the County with each piece of equipment as a minimum, two complete sets, or the number of sets called for in the Technical Specifications, of suitably marked special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment.

2. The Contractor shall submit, for approval by the Engineer, a complete list of the special tools and appliances to be furnished. Such tools and appliances shall be furnished in approved painted steel cases properly labeled and equipped with good grade cylinder locks and duplicate keys.

1.04 OPERATION AND MAINTENANCE MANUALS

A. Final Operations and Maintenance Manuals:
   1. As a prerequisite to obtaining payments for equipment furnished under this Contract in excess of fifty percent of the Contract amount, the Contractor shall prepare, submit and obtain the Engineer's approval of an operation and maintenance manual for each item of equipment supplied under this Contract. Each item of equipment shall be identified with the equipment identification number given in the Contract Documents or as furnished by the Engineer. Each manual shall be prepared specially for this installation and shall include all approved Shop Drawings, all pertinent and legible instructions, technical bulletins and other printed matter required to provide fully accurate and comprehensive information for the safe and proper operation, maintenance and repair of the equipment item. It shall include, but not be limited to the following:
      a. Catalogs, diagrams, schematics, drawings, instructional bulletins and manuals marked by underlining, checking, the use of arrows or the obliteration or removal of extraneous data, so as to pertain only to the specific equipment item for which the manual is supplied. Original reprints of manufacturers' catalog information and maintenance data shall be furnished; photocopies or facsimile (FAX) copies will not be acceptable.
      b. Complete electrical schematics and wiring diagrams. Complete wiring between terminal points must be shown. Computerized diagrams are not acceptable.
      c. Drawings, diagrams, and illustrations shall be original quality and clearly legible. Facsimile copies are not acceptable. Reduced drawings shall not be reduced to less than one-half of the original size. All lines, dimensions, lettering, and text must be clearly legible.
      d. Reference to features and elements of equipment, such as operational limits of time, speed, pressure, temperature, etc., shall be clear, complete, and compatible with authoritative published engineering reference documents. Torque ratings shall be given for all bolted connections. All functional components, electrical systems, equipment, etc., shall be shown on diagrams and discussed in the text to identify their proper system relationship. Operation, service, trouble-shooting, checkout and in-line and bench repair procedures, identifying specific system characteristics of the equipment, shall be provided. Detailed start-up and shutdown procedures shall be included as a separate section for each piece of equipment or system.
      e. Recommended procedures and frequencies for preventive maintenance such as inspection, adjustment, lubrication, calibration, and cleaning shall be provided including pre-startup checklists for each piece of equipment and long-term shutdown maintenance.
      f. Equipment parts shall be identified by manufacturer's part number and located with relation to other components of the equipment utilizing "exploded" type drawings for clarity. Complete parts lists shall be included, which indicate the part number, the part description, applicable serial and model numbers, current unit prices and the name, address and telephone number of the nearest equipment manufacturer's representative and nearest service and spare parts warehouse. Complete instructions for the ordering of all replaceable parts shall be noted in this section of the Manual. Recommendations as to spare

parts and spares inventory levels shall be made. Lead time and shelf life values and preservation, packaging and labeling methods shall be recommended.

g. All copyrighted material used in the manual or in any operation required in the performance of the Contract will be preceded by the Contractor obtaining the copyright holder's written permission to use such material. The Contractor shall hold the County and the Engineer free of any legal responsibility for its use.

2. Each operation and maintenance manual shall be bound in a durable, permanent, stiff cover binder of one (more if required) volume with a complete index of the manual's contents arranged by subject matter and in order of presentation in each volume. Applicable equipment item numbers, as shown in the Contract Documents, shall be prominently included at their appropriate location in the index. The title of the manual shall be securely affixed to the binder in two places: the front cover and the binder back edge. The title shall identify the Project by number and name, state the volume is an O&M manual, generally classify the equipment and state the manufacturer's name, equipment model number and equipment identification number.
   a. Covers shall permit easy removal of pages and shall be of the three-post, metal-hinged, self-expanding type and shall not be overfilled. Covers shall be oil, moisture and wear resistant and approximately 9 by 12 inches in size.
   b. Page size shall be 8-1/2-inch by 11-inch; paper shall be sixty (60) pound and reinforced holes with plastic cloth or metal.
   c. Drawings, diagrams, and illustrations shall be attached foldouts up to 11 by 17 inches in size; larger sizes shall be inserted in the attached clear plastic envelopes marked as to contents.
3. Contractor's submittal to the Engineer for approval shall consist of three complete sets of each operation and maintenance manual and two copies of an itemized listing providing cross-reference identification between the Specification Sections of the Contract Documents, the approved Shop Drawings, and the operations and maintenance manual submittal. One copy of the manual and itemized listing will be returned to the Contractor stamped either "Approved" or "Disapproved", the latter when the Manual submittal is considered inadequate, inaccurate, or lacking essential information. Discrepancies will be noted on the return itemized listing of a "Disapproved" submittal. The Contractor shall rectify all unapproved submittals by replacing submitted portions or adding additional data, as required, to the manual. The manual's index of contents and the itemized, cross-referenced listing shall be revised to reflect all revisions or additions made. Then two copies of the entire package shall be resubmitted to the Engineer for approval.
4. Upon approval of the operation and maintenance manuals, the Contractor shall submit ten copies and a searchable PDF file of the manual and the itemized listing to the County.

1.05 MAINTENANCE AND LUBRICATION SCHEDULES

A. For all items of equipment furnished, Contractor shall provide a list including the equipment name, and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained. In addition, a maintenance and lubrication schedule for each piece of equipment shall be submitted with the Shop Drawings. Submission shall be in fifteen copies. The schedules shall be in the form indicated below.

SAMPLE MAINTENANCE SCHEDULE			
Item	**Action**	**Frequency**	**Remarks**

SAMPLE LUBRICATION SCHEDULE				
Item	**Manufacturer's Recommendations**	**Type Lubricant**	**Quantity Per Tank**	**Frequency**

1.06 EQUIPMENT START-UP SERVICES

A. Equipment start-up period, shall begin after satisfactory completion and acceptance of the field tests described in Section 01660 and shall end before the certified date of substantial completion for the part of the Work for which the equipment is included. If the equipment is not covered by a certificate of substantial completion for a part of the Work, the period shall begin upon substantial completion of the Project.

B. During the equipment start-up period the Contractor shall furnish, at no additional cost to the County, the services of factory-trained representatives of the equipment manufacturers for the equipment designated in the Specifications to:
   1. Assist in the start-up and operations of the equipment.
   2. Conduct training of plant personnel in the proper operation and maintenance of the equipment.

C. The County shall:
   1. Provide the necessary plant personnel for training in the operation and maintenance of the equipment during their regularly assigned work shifts.

D. The Contractor shall pay for all chemicals consumed up to the date of "certified substantial completion", and in addition shall provide the quantities of fuel and chemicals specified in Section 014550, Quality Control.

E. The Contractor shall be available to promptly repair all Work during the start-up period to cause minimum disruption to the total plant operation.

F. Upon completion of a minimum of ten consecutive twenty-four (24)-hour days of satisfactory operation, or the number of days called for in the Technical Specifications, the County will assume operation and operating cost of the equipment. If the equipment malfunctions during this start- up period, the start-up period will be repeated until satisfactory operation is achieved.

G. In the event a system, equipment or component proves defective or is unable to meet specified performance criteria, the Contractor shall replace the defective item, and the minimum two years guarantee period, or the guarantee period called for in the Technical Specifications for the item, shall start after satisfactory replacement and testing of the item.

1.07 TRAINING

A. General:
   1. Manufacturer shall provide the services of factory trained specialists to instruct the County's operation and maintenance personnel in recommended operation and corrective and preventive maintenance procedures for equipment as specified in

the respective equipment Section and outlined in the attached schedule at the end of this Section. Training shall be scheduled prior to start-up of the equipment.

2. The qualifications of the specialists shall be subject to approval by the County's representative.
3. Manufacturer shall be responsible for coordinating these services at times acceptable to the County, with a minimum of 14 days prior notice, after an approval of the Lesson Plan.
4. Manufacturer shall provide a combination of classroom, equipment site, and machine shop training. All training shall be conducted at the Cedar Creek Water Pollution Control Plant unless otherwise specified.
5. Manufacturer shall provide the minimum training for each piece of equipment as specified in the attached schedule.
6. The County reserves the right to videotape all manufacturer training sessions.

B. Submittals:
   1. Manufacturer shall submit for approval proposed Lesson Plans for the instruction prior to scheduling training. Lesson plans shall include operations, mechanical maintenance, and electrical and instrumentation maintenance as outlined in the attached schedule at the end of this section.
   2. Manufacturer shall submit for approval credentials of their designated instructors with the Lesson Plan Submittals. Credentials shall include a brief resume and specific details of the instructor's experience with operation and maintenance of and training on the equipment specified.

C. Instruction Lesson Plans:
   1. Manufacturer's proposed Lesson Plans shall include the elements presented in the Training Instruction Lesson Plans in Paragraph 1.7,C.4, and any other information necessary for proper operation and maintenance of the equipment. Specific components and procedures shall be identified in the proposed Lesson Plan.
   2. Manufacturer's proposed Lesson Plans shall detail specific instruction topics. Training aids to be utilized including handouts, in the instruction shall be referenced and attached to the proposed Lesson Plan. "Hands-On" demonstrations planned for the instruction shall be described in the Lesson Plans.
   3. The manufacturer shall indicate the estimated duration of each segment of the training Lesson Plans and the training audience the instruction is to address.
   4. Training Instruction Lesson Plans: Guide for Equipment Maintenance:
      a. Maintenance Training:
         1) System Overview.
            a) Describe the function and performance objectives of the equipment or system.
            b) Describe the main features of the equipment or system.
            c) Identify all support system and related auxiliary equipment.
         2) Preventive Maintenance (PM):
            a) Define the recommended PM program and schedules for each system and equipment item.
            b) Describe PM procedures.
            c) Describe inspection and test procedures and use of test equipment, if applicable.
            d) Describe routine inspection procedures required to:
               i. Perform an inspection of equipment while it is operating.
               ii. Identify symptoms of potential problems to anticipate breakdowns.
            e) Describe equipment housekeeping procedures,
            f) Equipment Troubleshooting:

g) Define recommended systematic troubleshooting procedures.
h) Provide component-specific troubleshooting checklists.
i) Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.

3) Equipment Corrective Maintenance:
a) Describe recommended equipment preparation requirements.
b) Identify and describe the use of any special tools required for maintenance of the equipment.
c) Describe component removal/installation and disassembly/assembly procedures.
d) Perform at least two "hands-on" demonstrations of common corrective maintenance repairs.
e) Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
f) Define recommended torque, mounting, calibration, and/or alignment procedures and settings, as appropriate.
g) Describe recommended procedures to check/test equipment following a corrective repair.

b. Operations Training:
1) System Overview:
a) Describe the function and performance objective of the equipment or system.
b) Describe the main features of the equipment or system.
c) Identify all support systems and related auxiliary equipment.

2) Operation:
a) Describe operating principles and practices.
b) Describe routine operating, startup, and shutdown procedures.
c) Describe alarm conditions and response to alarms. Identify safety features and control interlocks.
d) Describe routine monitoring and record keeping procedures.

D. Responsibilities:
1. Manufacturer's Instructors shall be fully prepared for the training sessions. Training delivery shall be communicative, clear and proceed according to the approved lesson plan material covered shall be appropriate for the personnel in attendance. If training delivery is found by the County or Engineer to be not to Standards or requirements, the training shall be postponed and rescheduled at a cost to be borne by the Contractor.

E. Training Schedule and Operation & Maintenance Manuals: To provide the County with adequate time requirements for manufacturer's training, minimum training times for various pieces of equipment and systems are listed on the attached schedule. The Schedule also references sections that will require an Operation & Maintenance Manual.
1. Schedule 017823-A: Schedule of specification sections requiring an Operations and Maintenance Manual:

Training Schedule Specification Sec.	Description of Equipment	Minimum Training Time
331411	Valves	2 hours
331625	Water Storage Tank	2 hours

END OF SECTION

SECTION 017839 – PROJECT RECORD DOCUMENTS

PART 1 – GENERAL

1.01 GENERAL

A. The Contractor shall maintain and provide the Engineer with Project record documents as specified below except where otherwise specified or modified in the Specifications or in the General Conditions, Article GC-5, "Drawings and Specifications" and Article GC-36, "Record Drawings."

1.02 MAINTENANCE OF DOCUMENTS

A. Maintain the Contractor's field office in clean, dry, legible condition, complete sets of the following: Contract Drawings, Specifications, Addenda, approved Shop Drawings, Samples, photographs, Change Orders, other Modifications of Contract, test records, survey data, Field Orders, and all other documents pertinent to Contractor's Work.

B. Provide files and racks for proper storage and easy access. File in accordance with the filing format of the Construction Specification Institute (CSI) unless otherwise approved by the Engineer.
   1. Make documents available at all times for inspection by the Engineer and the County representative.
   2. Record documents shall not be used for any other purpose and shall not be removed from the office without the Engineer's approval.

1.03 RECORDING UPDATED INFORMATION

A. General:
   1. Label each document "PROJECT RECORD" in 2-inch high printed letters.
   2. Keep record documents current, and updated at least monthly.
   3. Do not permanently conceal any Work until required information has been recorded.

B. Contract Drawings: Legibly mark to record actual construction including:
   1. Depths of various elements of foundation in relation to datum.
   2. Horizontal and vertical location of underground utilities and appurtenances referenced to permanent surface improvements.
   3. Location of internal utilities and appurtenances concealed in construction referenced to visible and accessible features of structure.
   4. Field changes of dimensions and details.
   5. Changes made by Change Order or Field Order.
   6. Details, not on original Contract Drawings.

C. Specifications and Addenda: Legibly mark up each Section to record:
   1. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.
   2. Changes made by Change Order or Field Order.
   3. Other matters, not originally specified.

D. Shop Drawings: Maintain as record documents and legibly annotate Drawings to record changes made after review.

1.04 FINAL SUBMISSION OF RECORD DOCUMENTS

A. Record Drawings:

1. At the completion of the Work, Contractor shall furnish to the Engineer record drawings one (1) reproducible media set and on USB thumb drive, (1) electronic bound AutoCAD drawing set in Release 2012 or later and one (1) compiled PDF set showing the actual in-place installation of these items installed under this Contract. The AutoCAD drawings shall conform to the Cedar Creek Program and specific contract CAD Plans. Drawings shall show the Work in plan and sections as required for clarity with reference dimensions and elevations for complete Record Drawings. Documentation shall be furnished not later than thirty (30) days after the completion of the Work and prior to Final Payment.
2. At the completion of all electrical Work under this Contract, the Contractor shall furnish to the Engineer, reproducible tracings showing a one-line diagram of the distribution system and the actual in-place grounding system, lighting arrangement , motor control centers, equipment and conduit and cable plans. Tracing shall be furnished not later than thirty (30) days after the completion of the Work and prior to Final payment
3. The Contract Drawings may be used as a starting point in developing these Drawings. The Subcontractor and manufacturer's drawings may be included in this package. The drawing package must be fully integrated and include the necessary cross-references between Drawings. The drawing package shall include interconnection and termination details to the equipment furnished un this Contract.
4. All Drawings shall be submitted for approval of the Engineer. This shall include the following composite drawings for the system being furnished:
    a. Schematic (Electrical) Diagrams: This shall include but not be limited to complete schematics including items furnished by others for the following:
        1) Motor control circuits for starters furnished under this Contract.
        2) Substation controls.
    b. Wiring (connection) diagrams: These shall be included for all pre-wired equipment furnished under this Contract.
    c. Interconnection diagrams: These shall include all interconnections to be furnished under this Contract.
    d. Conduit and cable schedules: These shall include all conduit and cable furnished under this Contract.
    e. Dimension of outline drawings: These shall include all equipment furnished under this Contract.
    f. Power and lighting layout drawings: These shall include all conduits and wiring furnished under this Contract.

B. Submittal:
    1. At completion of Project, deliver record documents to the Engineer.
    2. Accompany submittal with transmittal letter containing:
        a. Date.
        b. Project title and number.
        c. Contractor's name and address.
        d. Title and number of each record document.
        e. Certification that each document as submitted is complete and accurate.
        f. Signature of the Contractor, or his authorized representative.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION

SECTION 019100 – COMMISSIONING

PART 1 - GENERAL

1.01 - SUMMARY

A. This Section specifies the Contractor's responsibilities in the commissioning process. Commissioning requires the participation of the Contractor to ensure that all systems are operating in a manner consistent with the Contract Documents.

B. The commissioning process integrates the traditionally separate functions of system documentation, equipment startup, performance testing and training. Commissioning during the construction phase is intended to achieve the following specific objectives in accordance with the Contract Documents:
   1. Verify and document that applicable equipment and systems are installed according to the manufacturer's recommendations, contract requirements, and industry standards, and that they receive adequate operational checkout by installing contractors.
   2. Verify and document proper performance of equipment and systems.
   3. Verify and document that O&M documentation is complete.
   4. Verify and document that Owner personnel are properly trained.

C. The systems and equipment to be commissioned are listed in this Section. The Contractor's general commissioning requirements and coordination are detailed in this Section. Specific requirements for commissioning of each system or piece of equipment are detailed in the specification Section for the individual systems or pieces of equipment. A detailed description of the overall commissioning process is included in the Schedule.

D. The commissioning process does not reduce the responsibility of the Contractor to provide finished and fully functional systems and equipment.

1.02 - SYSTEMS TO BE COMMISSIONED

A. The following systems will be commissioned in this project. Specific requirements for the commissioning of each system are included in the related specification Section.
   1. Protected Water Storage Tank
   2. Instrumentation and Control / SCADA System
   3. Gate Valves on storage tank inlet/outlet piping.

B. Example Commissioning Documents: Equipment and system specific Pre-Functional Checklists and Functional Test procedures will be developed by the Commissioning Authority based on approved submittals, and then will be provided to the Contractors.

1.03 - DEFINITIONS

A. Acceptance Phase: Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.

B. Approval: Acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes in accordance with the Contract Documents.

C. Commissioning Plan: An overall plan that provides the structure, schedule and coordination planning for the commissioning process.

D. Commissioning Team: The members of the commissioning team consist of the Owner's representative (s), the Contractor, the architect/engineer.

E. Deferred Functional Tests: Functional tests that are performed after substantial completion, due to partial occupancy, seasonal requirements, design or other site conditions that prevent the test from being performed prior to substantial completion.

F. Deficiency: A condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents.

G. Factory Testing: Testing of equipment on-site or at the factory by factory personnel.

H. Functional Performance Test (FT): Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation. Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The Contractor develops the functional test procedures in sequential written form. The Owner's representative coordinates, oversees and documents the actual testing. The Contractor performs the functional tests. FTs are performed after prefunctional checklists and startup is complete.

I. Phased Commissioning: Commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order to minimize the total construction time. Commissioning shall be provided for each phase according to the schedule for that phase. Some repetition and/or remobilization may be required.

J. Prefunctional Checklist (PC): A list of items to inspect and component tests to conduct to verify proper installation of equipment prior to initiating functional testing.

K. Startup: The initial starting or activating of dynamic equipment, including executing prefunctional checklists.

1.04 - COORDINATION

A. All members of the commissioning team shall work together to fulfill their contractual responsibilities and meet the objectives of the Contract Documents.

B. Integrate all commissioning activities into the approved progress schedule. All parties will address scheduling problems and make necessary notifications and changes in a timely manner in order to expedite the commissioning process and maintain the approved progress schedule.

1.05 - COMMISSIONING PROCESS

A. Commissioning Plan. The commissioning plan provides guidance in the execution of the commissioning process. Following the initial commissioning scoping meeting the Owner's representative will update the plan which is then considered the "final" plan, although it may be revised as the project progresses.

B. Commissioning Process. The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur. A more detailed description of the commissioning process can be found in the Appendix.
   1. Commissioning during construction begins with a scoping meeting conducted by the Owner's representative where the commissioning process is reviewed with the Commissioning Team.
   2. Additional meetings will be required throughout construction, scheduled by the Owner's Representative, to plan, scope, coordinate, and schedule future activities and to resolve problems. When possible, commissioning meetings will be scheduled immediately following construction meetings.
   3. Equipment documentation is submitted to the Engineer during the submittal process, including detailed start-up procedures.
   4. The Owner's representative works with the Contractor to develop startup activity lists and startup documentation. The Owner's representative provides pre-functional checklists to be completed by the Contractor during the startup process.

5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels. In each case prefunctional checklists are completed, submitted, and approved before functional testing begins.
6. The Contractor executes and documents the prefunctional checklists, and provides notification to the Owner's Representative. The Contractor performs startup and initial checkout. The Owner's representative documents that the checklists and startup were completed according to the approved plans.
7. The equipment manufacturer develops specific equipment and system functional performance test procedures. The Contractor reviews the procedures and submits suggestions or comments. Procedures are finalized by the Owner's representative.
8. The procedures are executed by the Contractor.
9. Items of non-compliance in material, workmanship, or setup are corrected and retested at the Contractor's expense. The Contractor is responsible for providing all resources, manpower, and materials necessary to rectify deficiencies as per requirements of the approved schedule.
10. The O&M documentation prepared by the Contractor is reviewed for completeness by the Owner's representative.
11. Commissioning is completed before Substantial Completion.
12. The Owner's representative reviews, pre-approves and coordinates the training provided by the Contractor and verifies that is was completed.
13. Deferred testing is conducted, as specified or required.

1.06 - CONTRACTOR'S RESPONSIBILITIES

A. The Contractor's commissioning responsibilities are as follows (all references apply to commissioned systems and equipment only):
   1. Construction and Acceptance Phase:
      a. Attend the commissioning scoping meeting and other necessary meetings scheduled by the Owner's Representative to facilitate the commissioning process.
      b. Facilitate the coordination of the commissioning work by the Owner's representative, and with the Owner's representative ensure that commissioning activities are being scheduled into the approved progress schedule.
      c. Provide detailed manufacturer installation and start-up, operating, troubleshooting and maintenance procedures, factory test reports, and full warranty information, including all responsibilities of the Director to keep the warranty in force. The installation, start-up and checkout materials that are actually shipped with the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the Owner's representative. The Owner's representative may request further documentation necessary for the commissioning process.
      d. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
      e. Ensure that all subcontractors execute their commissioning responsibilities according to the Contract Documents and approved progress schedule.
      f. Assist in the process of writing detailed test procedures by clarifying the operation and control of commissioned equipment.
      g. Review test procedures to ensure feasibility, safety and equipment protection and provide necessary written alarm limits to be used during the tests.
      h. Develop a full start-up and testing plan using manufacturer's start-up procedures and the prefunctional checklists from the Owner's representative for all commissioned equipment. Submit to the Owner's representative for review and approval prior to startup.
      i. During the startup and initial checkout process, execute all portions of the prefunctional checklists for all commissioned systems and equipment. Verify that

system installations include all ports, gages, thermometers, access doors, valves, etc., required for specified functional performance testing.

j. Provide all special tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment.

k. Perform and clearly document all completed startup and system operational checkout procedures, providing a copy to the Owner's representative.

l. Address incomplete Work before functional performance testing.

m. Provide skilled technicians to execute startup of equipment and to execute the functional performance tests. Ensure that they are available and present during the agreed upon schedules and for sufficient duration to complete the necessary tests, adjustments and problem-solving.

n. Provide skilled technicians to perform functional performance testing under the direction of the Owner's representative for specified equipment. Provide Manufacturer's Representative as required and as specified in the Specification. Assist the Owner's representative in interpreting the monitoring data, as necessary.

o. Correct deficiencies (differences between specified and observed performance) as directed by the Owner's Representative.

p. Prepare O&M manuals according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions. Provide a copy of the O&M manuals and submittals of commissioned equipment to the Owner's representative for review and approval.

q. Provide training as specified.

r. Coordinate with equipment manufacturers to determine specific requirements to maintain the validity of the warranty.

2. Warranty Period:

a. Execute seasonal or deferred functional performance testing in accordance with the specifications.

b. Correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing.

PART 2 - PRODUCTS

2.01 - TEST EQUIPMENT

A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Contractor.

B. Specified special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment shall be provided by the Contractor, and turned over to the Owner at the completion of the Work.

C. Datalogging equipment and software required to test equipment shall be provided by the Contractor but shall not become the property of the Owner.

D. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance with the tolerances specified in the Specifications. All equipment shall be calibrated according to the manufacturer's recommended intervals. Calibration tags shall be affixed or certificates readily available.

PART 3 - EXECUTION

3.01 MEETINGS

A. Scoping Meeting. Prior to the commencement of construction, the Owner's representative will schedule, plan, and conduct a commissioning scoping meeting with the Commissioning Team.

B. Miscellaneous Meetings. Other meetings will be planned and conducted by the Owner's representative as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with the Contractor, appropriate sub-contractors and suppliers and the Engineer.

3.02 - START-UP, PREFUNCTIONAL CHECKLISTS, AND INITIAL CHECKOUT

A. Prefunctional checklists and initial checkout shall ensure that the equipment and systems are hooked up and operational. Each piece of equipment receives full prefunctional checkout. No sampling strategies are used. The prefunctional testing for a given system must be successfully completed prior to formal functional performance testing of systems or equipment.

B. Start-up and Initial Checkout Plan. The Engineer shall assist the commissioning team members responsible for startup of any equipment in reviewing detailed start-up plans for all equipment. The primary role of the Engineer in this process is to ensure that there is written documentation that each of the manufacturer's recommended procedures have been completed.

C. Execution of Prefunctional Checklists and Startup.
   1. Four weeks prior to startup, the Contractor shall schedule startup and checkout with the Owner's Representative.
   2. The Contractor shall execute startup and provide the Engineer with a signed and dated copy of the completed start-up and prefunctional tests and checklists.

3.03 - FUNCTIONAL PERFORMANCE TESTING

A. Development of Test Procedures. Using the requirements in the specifications, develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Prior to testing, provide a copy of the test procedures to the Engineer who shall review the tests for feasibility, safety, equipment, and warranty protection.

B. Functional performance testing shall document that each system is operating in accordance with the Contract Documents. During the testing process, areas of deficient performance shall be identified. Deficiencies shall be corrected by the Contractor and functional testing shall be re-scheduled. The Contractor shall be responsible for all costs associated with re-testing for functional performance.

C. Each system shall be operated through all modes of operation. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested.

D. Test Methods. Each function and test shall be performed under conditions that simulate actual conditions as closely as possible. The Contractor shall execute the test and shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At the completion of the test, the Contractor shall return all building equipment and systems affected by these temporary modifications to their pre-test condition.

3.04 - OPERATION AND MAINTENANCE MANUALS

A. O&M Manuals. The specific content and format requirements for the O&M manuals are detailed in Section 017823.

B. Compile and prepare commissioning documentation for all equipment and systems and include this information in the O&M manuals.

3.05 - TRAINING

A. Coordinate, schedule, and document that all required training has been completed successfully.

B. The Contractor shall have the following training responsibilities:
   1. Provide a training plan not less than two weeks before the planned training.
   2. Provide comprehensive orientation and training in the understanding of the systems and the operation and maintenance of each piece of equipment.
   3. Training shall normally start with classroom sessions followed by hands-on training on each piece of equipment.
   4. The training sessions shall follow the outline in the Table of Contents of the operation and maintenance manual and illustrate whenever possible the use of the O&M manuals for reference.
   5. Training shall include:
      a. Use of the printed installation, operation and maintenance instruction material included in the O&M manuals.
      b. A review of the written O&M instructions emphasizing safe and proper operating requirements, preventative maintenance, special tools needed and spare parts inventory suggestions. The training shall include start-up, operation in all modes possible, shut-down, and any emergency procedures.
      c. Discussion of relevant health and safety issues and concerns.
      d. Discussion of warranties and guarantees.
      e. Common troubleshooting problems and solutions.
      f. Explanatory information included in the O&M manuals and the location of all plans and manuals in the facility.
      g. Discussion of any peculiarities of equipment installation or operation.

3.06 - DEFERRED TESTING

A. Unforeseen Deferred Tests. If any check or test cannot be completed due to project conditions, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the Owner's Representative. These tests will be conducted in the same manner as the seasonal tests as soon as possible.

B. Seasonal Testing. Seasonal testing (tests delayed until weather conditions are closer to the system's design conditions) shall be completed as part of this Contract. Make any final adjustments to the O&M manuals and as-builts resulting from information gained during testing.

3.07 - SCHEDULE

A. Verify Instrumentation and Control / SCADA System are operating as required.

B. Verify level measurement devices are accurate.

C. Verify valves fully open and fully close.

END OF SECTION

PART 1 – GENERAL

1.01 - GENERAL

A. The intent of this Section is to have the Contractor perform the Work in such a manner that continuous, uninterrupted use of protected storage system water and all essential facility services and facilities are maintained operational throughout the construction period.

B. Except for the scheduled shutdowns specified in this Section, the existing facility will be maintained in continuous operation by the Owner during the entire construction period. Schedule and conduct Work under this Contract to not impede any treatment process, create potential hazards to operating equipment and Owner personnel, reduce the conveyance capacity or cause odor or other nuisance. In performing the Work shown and specified, plan and schedule Work to meet both constraints outlined in this Section and facility operating requirements.

C. The Work covered in the following paragraphs may not be all inclusive of all work which may affect facility operations. All operations which involve the demolitions, isolation or tie in to existing facility equipment and/or systems shall be submitted for approval.

E. Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without additional cost to the Owner, and provided that all requirements of these Specifications are fulfilled.

F. Do not shut off or disconnect any operating system of the Facility. All Facility equipment operation and equipment shutdowns will be executed by the Owner. Establish a Lock Out Tag Out (LOTO) system for the safety of the workers in conjunction with Facility's LOTO.

G. Be aware that existing valves, dampers, sluice gates, and other shutoff devices may not be tight closing and that supplemental pumping and/or other means may have to be provided by the Contractor to isolate the system as intended.

H. The Work includes equipment, piping, material and appurtenances to be removed or reinstalled. Refer to the Drawings and other applicable Sections for definition of the equipment, piping, material and appurtenances to be removed and turned over to the Owner and stored on site, or to become the property of the Contractor and removed from the site.

I. Related Sections:
   1. Section 015000 - Temporary Facilities and Controls.
   2. Section 024119 - Selective Demolition.

1.02 - GENERAL CONSTRAINTS

A. The following constraints shall be applied to all equipment and appurtenant utility systems on the site of the Work.
   1. Load Limits on Access Roads: Existing and new underground facilities such as electrical duct banks, pipelines, etc., in, under and crossing facility roads have been designed for a maximum wheel load of AASHTO H-20. The Contractor shall not exceed this weight limit.
   2. Access to Facility Site: An unobstructed traffic route to all entrance roadways to the site shall be maintained at all times.
   3. Internal Roads Access: Vehicular access to all facilities shall be maintained at all times.
   4. Personnel Access: Maintain Owner access to all areas that remain in operation throughout the construction period.
   5. Potable Water System: Maintain operation of existing potable water system at all times.

6. Plumbing Facilities: Maintain building plumbing systems such as roof and floor drains, pumping, etc.
7. Storm Drainage: Storm drainage on the site shall be operational at all times.
8. Building Heating and Ventilating: In the Contractor's work areas and areas affected by the Contractor's operations, building heating and ventilating shall be both provided and maintained. Temperatures to be maintained as specified in Section 015000, Temporary Facilities and Controls.
9. Power, Light and Communication Systems: Electric power, lighting service and communication systems shall be maintained in uninterrupted operation in all areas. Coordinate short-term shut-down during installation of new equipment to electrical system.
10. Draining Process Tanks, Pipes and Conduits: Unless otherwise specified, the contents of tanks, pipes and conduits undergoing modifications shall be transferred to the Facility sewer system using hoses, piping, or pumps (if hydraulic conditions so require them) by the Contractor.
11. Protected Water Storage System: Maintain operation of existing protected water system at all times. Coordinate short-term shut-down during installation of piping connections to new tank.

1.03 - SHUTDOWNS

A. General:
1. Shutdown shall be defined to indicate that a portion of the normal operation of a Facility unit has to be suspended or taken out of service in order to perform the specified work. For each shutdown, compile an inventory of labor and materials required to perform the tasks, an estimate of the time required and a written description of steps required to complete the tasks. Contingency time shall be provided where existing shut-off devices do not close tight and supplemental pumping and/or other devices are required to maintain dry conditions. The inventory, the estimate and written procedure shall be submitted to the Owner for review 14 calendar days prior to the proposed start date of the shutdown. Also request in writing, from the Owner, approval for each shutdown a minimum of seven calendar days prior to the proposed date. No shutdown shall be initiated until the list of materials and labor is verified on site at least one week prior to the proposed start date.
2. Work required which will interrupt the normal Facility operations shall be accomplished at such times that will be convenient to the Owner.
3. Provide 7-day advanced notice of needed shutdowns to all Facility and Operations staff.
4. Have on hand, located in close proximity to the Work area, all tools, equipment and materials, both temporary and permanent, necessary to complete each work category, without interruption. Adequate numbers of personnel shall be scheduled for each shutdown, so that the work may be accomplished within the specified time frame. Prefabrication of all piping, ductwork and other assemblies shall be completed to greatest degree possible, prior to any shutdowns. The Owner shall be satisfied that the Contractor has complied with these requirements, to the fullest extent possible, before shutdowns will be authorized.

B. Shutdowns of Mechanical and Electrical Systems: The Contractor and the Owner shall each lock out and tag circuit breakers and switches operated by the Owner. Check cables and wires to confirm they are de-energized to ground potential before Work begins and that all mechanical isolation devices are functional. Upon completion of the Work, the Contractor shall remove the locks and tags and advise the Owner that the facilities are available for use. The Owner will then remove their locks and place facilities back into use.

1.04 - OVERTIME

A. Overtime Work by the Contractor necessary to conform to the requirements of this Section and related Sections shall be performed by the Contractor and the Contractor shall make no claims for extra compensation as a result thereof.

1.05 - MAINTENANCE OF FACILITY OPERATIONS (MOPO) AND SEQUENCE OF CONSTRUCTION

A. In order to maintain a continuous plant operation during construction, a MOPO Description Section is included after this Section. The category order and item order within each category are not intended as an exact sequence of work or a listing of priorities. However, within each item procedural steps, time constraints and milestone dates may be outlined and are intended to recommend a sequence and timing in order to maintain the continuous operation of the Plant.

B. The Contractor shall note that all necessary shutdowns may not be included in the MOPO Descriptions. As the need for additional shutdowns becomes evident, the Contractor shall notify the Engineer, who with assistance and approval of the County, will arrange for necessary shutdowns.

C. Contractor is advised that work in multiple areas of the Plant performed simultaneously may be required in order to complete the entire scope of the Contract within the allotted time.

D. Refer to "Detailed MOPO Descriptions", located after "End of Section" designation.

PART 2 – PRODUCTS

Not Used

PART 3 – EXECUTION

Not Used

PART 4 – DETAILED MOPO DESCRIPTIONS

Detailed Maintenance of Plant Operations (MOPO) Descriptions

Index to MOPO Items

Item No.:	Description:	Page:
1	Preliminary site work including: utility mark out, erection of safety fencing, erosion control facilities, clearing and grubbing, temporary construction fence and test pits.	
2	Installation of new 260,000-gallon nominal capacity glass-fused to steel water storage tank.	
3	Remove and dispose of existing 250,000-gallon water storage tank.	
4	Modifications to existing site piping including but limited to: Installation of fittings and valves on the existing Cedar Creek WPCP Storage Tank 10” and 12” common inlet/outlet water mains, 12” storage tank overflow, and 10” effluent water. Existing	

	Cedar Creek WPCP Storage Tank to remain in service during construction. Installation of a new 10” and 12” water main, 12” storage tank overflow, 10” effluent water, and associated fittings and valves.	
5	Installation of radar level sensor connected to SCADA and associated electrical conduit, wiring and connections.	

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END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Demolition and removal of selected portions of building or structure.
   2. Demolition and removal of selected site elements.
   3. Salvage of existing items to be reused or recycled.

1.03 DEFINITIONS

A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.

B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.04 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition shall remain the property of Owner.
   1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.05 PREINSTALLATION MEETINGS

A. Predemolition Conference: Conduct conference at Project site.
   1. Inspect and discuss condition of construction to be selectively demolished.
   2. Review structural load limitations of existing structure.
   3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
   4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
   5. Review areas where existing construction is to remain and requires protection.
   6. Review procedures for turning over salvaged materials to the Owner and protected off-site storage of materials to be reused in the work of the project..

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For refrigerant recovery technician.

NCDPW number will replace H2M number when the issue date is updated for the final bid document

B. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting the public, pedestrian access and circulation areas and property , for environmental protection , for dust control and , for noise control. Indicate proposed locations and construction of barriers.

C. Schedule of Selective Demolition Activities: Indicate the following:
   1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
   2. Interruption of utility services. Indicate how long utility services will be interrupted.
   3. Coordination for shutoff, capping, and continuation of utility services.
   4. Use of elevator and stairs.
   5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

D. Inventory: Submit a list of items to be removed, salvaged and delivered to Owner prior to start of demolition.

E. removed, salvaged Photographs or Video: Submit before Work begins.

F. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.

G. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.

1.07 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.08 QUALITY ASSURANCE

A. Refrigerant Recovery Technician Qualifications: Certified by an EPA-approved certification program.

1.09 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use and is included in this Division of the specifications . Examine report and / or the appropriate specification section to become aware of locations where hazardous materials are present.

1. Hazardous material remediation is specified elsewhere in the Contract Documents.
2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
1. Maintain fire-protection facilities in service during selective demolition operations.
2. Provide a Fire Watch or other method acceptable to the authority having jurisdiction should the existing fire protection facilities have to be shut down during the work.
3. Do not disable or disrupt building fire or life safety systems without five (5) days prior written notice to Architect.

1.10 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.01 PEFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

C. LEED Requirements for Building Reuse:
1. Credit MR 1.1 and Credit MR 1.2: Maintain existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing, excluding window assemblies and nonstructural roofing material) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
2. Credit MR 1.3: Maintain existing interior nonstructural elements (interior walls, doors, floor coverings, and ceiling systems) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.
3. Credit MR 1.2 and Credit MR 1.3: Maintain existing nonshell, nonstructural components (walls, flooring, and ceilings) not indicated to be demolished; do not demolish such existing construction beyond indicated limits.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.

C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.

D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

E. Engage a professional engineer to perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
   1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.

F. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs .
   1. Inventory and record the condition of items to be removed and salvaged. Provide photographs of conditions that might be misconstrued as damage caused by salvage operations.
   2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.02 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
   1. Comply with requirements for existing services/systems interruptions specified in Section 011100 "Summary of Work."

B. Existing Services/Systems to be removed, relocated, or abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
   1. Arrange to shut off indicated utilities with utility companies. Provide 5 days notice to the Architect prior to any utility shut-downs.
   2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
   3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
      a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap, plug or reconnect remaining piping with same or compatible piping material.
      b. Equipment to Be Removed: Disconnect and cap services and remove equipment.
      c. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug or reconnect remaining ducts with same or compatible ductwork material.

C. Refrigerant: Remove refrigerant from mechanical equipment to be selectively demolished according to 40 CFR 82 and regulations of authorities having jurisdiction.

3.03 PREPARATION

A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
   1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."

B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building. Maintain existing required widths of egress pathways throughout.
   2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
   3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
   4. Cover and protect furniture, furnishings, and equipment that have not been removed.
   5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."

C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
   1. Strengthen or add new supports when required during progress of selective demolition.

3.04 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
   1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
   2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
   3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
   4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
   5. Maintain adequate ventilation when using cutting torches.
   6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
   7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
   8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
   9. Dispose of demolished items and materials promptly.

B. Reuse of Building Elements: Project has been designed to result in end-of-Project rates for reuse of building elements as follows. Do not demolish building elements beyond what is indicated on Drawings without Architect's approval.
   1. Building Structure and Shell: 75 percent.
   2. Nonshell Elements: 50 percent.
   3. Nonshell Elements: 40 percent.

C. Removed and Salvaged Items:
   1. Clean salvaged items.
   2. Pack or crate items after cleaning. Identify contents of containers.
   3. Store items in a secure area until delivery to Owner.
   4. Transport items to Owner's storage area designated by Owner or as indicated on Drawings.
   5. Protect items from damage during transport and storage.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.05 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 1 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

3.06 DISPOSAL OF DEMOLISHED MATERIALS

A. General: Except for items or materials indicated to be recycled, reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
   1. Do not allow demolished materials to accumulate on-site.
   2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
   3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.07 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

3.08 SELECTIVE DEMOLITION SCHEDULE

A. Remove, store, relocate, salvage and protect the following materials and equipment:
   1. Existing Items to Be Removed: Items indicated on contract drawings and items listed in technical specifications sections.
   2. Existing Items to Be Removed, relocated and/or Salvaged: Items required to be removed, relocated salvaged and/or stored to complete the work as indicated or called for in these construction documents.

B. Existing Items to Remain: to complete and conform to the work of the project shall be as indicated on the contract drawings and items listed in the technical specification sections..

END OF SECTION

PART 1 GENERAL

1.01 SUMMARY

A. This Section covers the handling, waste disposal and training requirements of working with materials coated with lead containing paint.

B. Perform work in accordance with applicable local, state and federal guidelines for impacting lead-containing paint.

1.02 REFERENCES

A. State Department of Transportation (DOT): Follow all regulations of 49CFR Part 100 through 199.

B. Occupational Safety and Health Administration (OSHA): Lead Exposure in Construction: Interim Final Rule 29 CFR 1926.62.

C. U.S. Department of Housing and Urban Development (HUD): Guidelines for evaluation and control of Lead based paint hazards: Title Ten of Housing and Community Act of 1992.

D. U.S. Environmental Protection Agency (EPA): Resource Conservation and Recovery Act (RCRA) Section 3004 Hazardous and Solid Waste Amendments.

E. U.S. Environmental Protection Agency (EPA): Toxicity Characteristics Leaching Procedure EPA Method 1311.

1.03 DEFINITIONS

A. Authorized Personnel: Owner or the Owner's Representative, and all other personnel who are authorized officials of any regulating agency, be it State, Local, Federal or Private entity who possess legal authority for enforcement or inspection of the work.

B. Containment: The enclosure within the building which establishes a contaminated area and surrounds the location where lead remediation is taking place and establishes a Lead Control Work Area.

C. Floor Surface Clearance Criteria: Shall be determined and established by an independent testing lab hired by the Owner, conforming to all standards set forth by all authorities having jurisdiction,

mentioned in the references, and issue the certification of cleaning. At a minimum no single post work lead wipe sample test values shall have reading levels greater than the levels established by pre-work wipe sampling test values, or greater than 40 mg/ft^2. Record levels in mg/ft^2.

D. Fixed Object: Mechanical equipment, electrical equipment, fire detection systems, alarms, and all other fixed equipment, furniture, fixtures or other items which cannot be removed from the work area.

E. HEPA: High Efficiency Particulate Absolute filtration efficiency of 99.97 percent down to 0.3 microns. Filtration provided on specialized vacuums and air filtration devices to trap particles.

F. Lead Based Paint (LBP): Paints or other surface coatings that contain lead equal to or greater than 1.0 milligrams per square centimeter or 0.5 percent of lead by weight.

G. Lead Dust Control Work Area: A cordoned off area with drop clothes or an enclosed area or structure with containment to prevent the spread of lead dust, paint chips, or debris from lead-containing paint disturbance operations.

H. PPE: Personal Protective Equipment.

1.04 ABBREVIATIONS

A. ASTM: American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103

B. CFR: Code of Federal Regulations, Government Printing Office, Washington, DC 20402

C. DOT: Department of Transportation

D. NIOSH: National Institute for Occupational Safety and Health, Building J, N.E. Room 3007, Atlanta, Georgia 30333

E. OSHA: Occupational Safety and Health Administration, 200 Constitution Avenue, Washington, DC 20210

F. USEPA: United States Environmental Protection Agency, 401 M Street SW, Washington, DC 20460

1.05 SUBMITTALS

A. Quality Control Submittals: Submit the entire Lead Abatement submittal package at the same

time.

1. Worker' Qualifications: Persons removing lead containing/coated material and their Supervisors shall be personally experienced in this type of work and shall have been employed by a company with a minimum of one year experience in this type of work. Submit a copy of documentation of completion of the EPA lead renovators training program. Submit Evidence that all personnel working on the removal of materials coated with lead containing paint have been trained in accordance with OSHA Standard 29 CFR 1926.62.
2. Name of lead supervisor on site during the work.
3. Submit one copy of the detailed work plan required under Quality Assurance Article.
4. Waste Transporter Permit: One copy of transporter's current waste transporter permit.

B. Contract Closeout Submittals:

1. Copies of OSHA compliance monitoring results or current objective data that indicates such tasks did not cause exposure above the PEL.
2. Assessment Report compiled by a testing lab certifying that the work area has lead concentrations below the levels specified under the cleaning criteria.
2. Disposal Site Receipts: Copy of waste shipment record and disposal site receipt showing that the lead-containing materials have been properly disposed of.

1.06 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the referenced standards.

B. Pre-Work Conference: Before the Work of this Section is scheduled to commence, a conference will be held by the Owner at the Site with the contractor and the lead handling subcontractor (if any) for the purpose of reviewing the Contract Documents, discussing requirements for the Work, and reviewing the Work procedures.

C. Detailed Lead-Containing Material Removal Work Plan: Before the physical Work begins, prepare and submit a detailed lead-containing material removal work plan.

1. The work plan shall indicate it complies with state, federal and local requirements for removing and disposing lead-containing materials during demolition activities. The plan shall include engineering controls, personal protective equipment, air-monitoring methods, signage, location of handwashing facilities, work practices, waste-handling and disposal, and any other pertinent information.

1.07 PROJECT CONDITIONS

A. Cut and alter existing materials as required to perform the work. Limit cutting to the smallest amount necessary. Flame cutting, high speed grinding or welding is prohibited on lead painted surfaces.

1.08 HEALTH AND SAFETY

A. Where in the performance of the work, workers, supervisory personnel or sub-contractors may encounter, disturb, or otherwise function in the immediate vicinity of contaminated items and materials, all personnel shall take appropriate continuous measures as necessary to protect all ancillary building occupants from the potential lead exposure. Such measures shall include the procedures and methods described herein and shall comply with all applicable regulations of Federal, State and Local agencies.

B. Workers shall receive training (29 CFR 1926.21) that includes the following:
   1. Information about the potential adverse effects of lead exposure.
   2. Information about the early recognition of lead intoxication.
   3. Instruction about heeding signs that mark the boundaries of lead-contaminated work areas.
   4. Discussion of the importance of personal hygiene in reducing lead exposure.
   5. Instruction about the use and care of appropriate protective equipment (including protective clothing and respiratory protection).
   6. Information about specific work practices for working safely with lead-based paints
   7. Information on the OSHA “Lead in Construction” Standard 29 CFR 1926.62 and an employee's right to access 29 CFR 1910.20.
   8. Contents of compliance plan in effect.

1.09 PERSONAL PROTECTIVE CLOTHING AND EQUIPMENT

A. Workers shall wear protective suits, protective gloves, and eye protection. Respiratory protection shall be in accordance with OSHA regulation 1910.134 and ANSI Z88.2.

B. Workers shall be trained in accordance with EPA requirements, have medical clearance and have recently received pulmonary function test (PFT) and respirator fit tested by a trained professional.
   1. A personal air sampling program shall be in place as required by OSHA.
   2. The use of respirators must also follow a complete respiratory protection program as

specified by OSHA.

PART 2 PRODUCTS

2.01 RESPIRATORS

A. Type: Approved by the Mine Safety and Health Administration (MSHA), Department of Labor, or the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

2.02 VACUUM CLEANERS

A. Type: Vacuums equipped with new HEPA filters.

2.03 PLASTIC SHEETS

A. Type: Minimum 6 mil., clear, fire retardant polyethylene sheets.

B. Floor Protective Layer: Minimum 10 mil., reinforced polyethylene sheets.

2.04 DISPOSAL BAGS

A. Type: Minimum 6 mil thick, clear polyethylene bags with preprinted Caution Label. Properly containerize/drum prior to disposal.

2.05 EQUIPMENT

A. Temporary lighting, heating, hot water heating units, ground fault interrupters, and all other equipment on site shall be UL listed and shall be safe, proper, and sufficient for the purpose intended.

B. All electrical equipment shall be in compliance with the National Electric Code, Article 305 - Temporary Wiring.

PART 3 EXECUTION

3.01 PREPARATION

A. Comply with all applicable Occupational Safety and Health Administration (OSHA) Requirements.

B. Employees shall wear the respiratory protection provided when it is required.

3.02 LEAD-CONTAINING/COATED MATERIAL HANDLING AND DISPOSAL

A. Handle and dispose of lead-containing materials in accordance with OSHA 1926.62 and the approved lead-containing material work plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when material containing or coated with lead containing paint is handled and disposed of in accordance with referenced standards.

B. Dispose of demolition debris with lead-based paint attached at a permitted demolition debris landfill.

C. Test results indicating a value greater than 5 ppm lead or 5mg/L classifies the removed material as Hazardous Waste.

3.03 RESTORATION

A. Remove temporary decontamination facilities and restore area designated for these facilities to its original condition or better.

B. Where existing construction is damaged or contaminated during the course of performing this project, restore area to its condition or better.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
   1. Footings.
   2. Foundation walls.
   3. Slabs-on-grade.
   4. Concrete toppings.

1.03 REFERENCES

A. ACI 301 - Specifications of Structural Concrete for Buildings.

B. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete.

C. ACI 305 - Hot Weather Concreting.

D. ACI 306 - Cold Weather Concreting.

E. ACI 308 - Standard Practice for Curing Concrete.

F. ACI 350 - Concrete Sanitary Engineering Structures.

G. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

H. ASTM C33 - Concrete Aggregates.

I. ASTM C94 - Ready-Mixed Concrete.

J. ASTM C150 - Portland Cement.

K. ASTM C260 - Air Entraining Admixtures for concrete.

L. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

M. ASTM C494 - Chemical Admixtures for Concrete.

N. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete.

O. ASTM C 1116- Standard Specification for Fiber Reinforced Concrete and Shotcrete.

P. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

Q. ASTM D2103 - Polyethylene Film and Sheeting.

1.04 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.05 ACTION SUBMITTALS

A. Comply with the requirements of Division 01 Specification of the Project Manual, Section 013300.

B. Product Data: For each type of product indicated.

C. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
   1. Indicate amounts of mixing water to be withheld for later addition at Project site.
   2. Submit mix design mixtures for each type of concrete to be used on the Project at least 30 calendar days prior to the first scheduled concrete pour. The Contractor's testing laboratory shall develop concrete mix designs and test all materials and mixes for conformance with ACI 301 and these specifications. The costs associated with development of the design mix and testing of samples shall be included in the bid price.
   3. Submit the following:
      a. Name, address, and telephone number of Contractor's laboratory.
      b. Mix proportions.
      c. Source of cement, type, brand, and certified copies of mill reports, including physical and chemical analysis.
      d. Sources of fine aggregates and results of test made in accordance with ASTM C33 and ASTM C40.
      e. Source of coarse aggregates and results of tests made in accordance with ASTM C33.
      f. Catalog cuts of all admixtures.
      g. Furnish test results of slump, air entrainment and water-cement ratio for each mix design.
      h. For each mix proposed, make and cure four (4) standard 6 inch concrete test specimens to the laboratory in accordance with ASTM C192. Furnish compression test results made in accordance with ASTM C39. Break two (2) cylinders at seven (7) days and two (2) at 28 days.
      i. If the concrete is intended to be pumped, design mix accordingly and submit certification that it has been tested for pumping.
      j. If adopted mix fails to produce concrete meeting the requirements for strength and placibility, the Owner's Representative may order additional cement or adjustments to mix proportions at no extra cost to the Owner.

D. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, spacing, locations, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement including steel bars and wire fabric.

E. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer licensed in the state where the project is located; detailing fabrication, assembly, and support of formwork. Shop drawings shall bear the signature and seal of the same licensed Professional Engineer.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal
2. Shop drawings shall indicate formwork dimensioning, materials and arrangement of joints and ties.
3. Manufacturer's instructions: Indicate installation procedure and interface required with adjacent work

F. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
1. Location of construction joints is subject to approval of the Owner's Representative, if not shown on the drawings.

1.06 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and testing agency.

B. Welding certificates.

C. Material Certificates: For each of the following, provided by manufacturers:
1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Curing compounds.
6. Bonding agents.
7. Adhesives and Vapor retarders.
8. Semi rigid joint filler.
9. Joint-filler strips.
10. Repair materials.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Field quality-control reports.

F. Furnish transit-mix delivery slips to Owner's Representative.

1.07 QUALITY ASSURANCE

A. Comply with Referenced Standards specified in Division 01 Section "Reference Standards" in addition to ACI 301.

B. Perform testing under the provisions of Division 01 Section "Quality Requirements" and the "FIELD QUALITY CONRTOL" Article of Part 3 listed in this specification.

C. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

D. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94 requirements for production facilities and equipment.
1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

E. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
   1. The contractor shall provide an adequately sized, insulated curing box to house concrete cylinders at the discretion of the Owner's Representative, for the 24-hour period between concrete pour and sample collection pick-up by the Testing Laboratory. As directed by the Owner's Representative, the contractor shall cure additional cylinders in the same fashion as the in-place concrete.
   2. Curing box shall be located away from the main construction area and shall be blocked up off the ground.
   3. A log sheet shall be provided in a waterproof sheet protector to log in the placement and removal of the concrete test samples by the testing laboratory.
   4. Minimum information to be logged for each pour date shall include: date of pour, date of pick-up, weather conditions at the time of pour, testing

F. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code - Reinforcing Steel."

G. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. ACI 301, "Specifications for Structural Concrete", Sections 1 through 5.
   2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials".
   3. ACI 304 - "Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete".

H. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

I. Preinstallation Conference: Conduct conference at Project site.
   1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
      a. Contractor's superintendent.
      b. Independent testing agency responsible for concrete design mixtures.
      c. Ready-mix concrete manufacturer.
      d. Concrete subcontractor.
   2. Review special inspection and testing and inspecting agency procedures for field quality control, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.08 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.

B. Store cement off the ground in a dry, weatherproof, adequately ventilated structure with provisions to prevent the absorption of water.

C. Transport dry concrete batches from the central plant to the site in approved truck mixers conforming to the requirements of the Truck Mixer Manufacturer’s Agitating Standards. Each truck shall contain a plate stating the capacity, drum speeds and be provided with a revolution counter.

D. Packaged material shall be delivered and stored in the original packages until ready for use. Packages or materials showing evidence of water or other damage shall be rejected.

E. Protect all materials from freezing.

1.09 COORDINATION

A. Coordinate work under provisions of Division 01 Specification of this Project Manual.

B. The Contractor shall provide at least five (5) working days advance notice prior to formwork closure to the Owner's Representative.

C. Coordinate work of other Sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors, and other inserts.

D. Notify the Owner's Representative a minimum of three (3) working days prior to commencement concrete pours.

1.10 REGULATORY REQUIREMENTS

A. Conform to Part 1 and all applicable codes for placement of concrete and related work.

1.11 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when the ambient temperature is below 40 deg. F. or when the concrete temperature exceeds 85 deg. F. Under certain circumstances, the Engineer may approve the placement of concrete under the above conditions, provided that the procedures of 2 and 1 are strictly adhered to.

B. Do not place concrete when the conditions may adversely affect the placing, curing or finishing of concrete, or its strength.

C. Comply with the requirements contained in Section 016500 - PRODUCT DELIVERY, STORAGE AND HANDLING.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
   1. Plywood, metal, or other approved panel materials.
   2. Steel forms: Minimum 16 gage thick, stiffened to support weight of concrete with minimum deflection.
   3. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
      a. Douglas Fir Species, solid one side grade and sound

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation. Inside surfaces shall be treated with a non-staining form release agent.

D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum unless indicated otherwise on the drawings.

G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal. Patterns and sizes as shown on the drawings.

H. Form-Release Agent: Commercially formulated, colorless, water based, non-toxic, V.O.C. compliant, environmentally safe material which will not stain concrete, absorb moisture or impair natural bonding or color characteristics of coating intended for use on concrete; manufactured by DAYTON SUPERIOR or equal. Agent shall not be detrimental to the environment.
   1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
   1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
   2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
   3. For Concrete Tanks: Furnish snap-ties with 1 inch plastic cone and waterseal washer.3.

2.02 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

B. Reinforcing Bars: ASTM A 615, Grade 60, deformed.

C. Galvanized Reinforcing Bars: ASTM A 615, Grade 60; ASTM A 706, deformed bars; 1, Class II zinc coated after fabrication and bending.

D. Steel Bar Mats: ASTM A184/A184M, fabricated from ASTM A615/A615M, Grade 60 ; ASTM A706/A706M, deformed bars, assembled with clips.

E. Deformed-Steel Wire: ASTM A 496.

F. Plain-Steel Welded Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets.

2.03 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A615/A615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
2. Provide load bearing pad on bottom to prevent vapor barrier puncture.

2.04 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
   1. Portland Cement: ASTM C150/C150M, Type IA, gray. Supplement with the following:
      a. Fly Ash: ASTM C 618, Class F or C.
      b. Ground Granulated Blast-Furnace Slag: ASTM C989/C989M, Grade 100 or 120.
   2. Silica Fume: ASTM C1240, amorphous silica.
   3. Normal-Weight Aggregates: ASTM C33/C33M, No. 57 or 67 crushed stone coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
      a. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
      b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
   4. Lightweight Aggregate: ASTM C330/330M, 3/4 inch, nominal maximum aggregate size.
   5. Water: ASTM C94/C94M, clean and not detrimental to concrete.

2.05 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
   1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
   2. Retarding Admixture: ASTM C494/C494M, Type B.
   3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
   4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
   5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
   6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.06 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class C or polyethylene sheet, ASTM D4397 not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive tape.
   1. Products: Subject to compliance with requirements, provide the following:
      a. Grace Construction Products, W. R. Grace & Co.; Florprufe 120
      b. Insulation Solutions, Inc.; Viper VaporCheck 10.
      c. Meadows, W. R., Inc.; Perminator 10 mil.
      d. Reef Industries, Inc.; Griffolyn 10 mil Green.
      e. Stego Industries, LLC; Stego Wrap 10 mil Class A.
      f. Or approved equal.

B. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D448, Size 10, with 100 percent passing a 3/8-inch sieve, 10 to 30 percent passing a No. 100 sieve, and at least 5 percent passing No. 200 sieve; complying with deleterious substance limits of ASTM C33/C33M for fine aggregates.

2.07 CURING MATERIALS

A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 8 oz. /sq. yd. when dry.

B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet weighing approximately 8 oz. / sq. yd. bonded to prevent separation during use.

C. Water: Potable.

D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B, dissipating.
   1. Products: Eucocure VOX as manufactured by Euclid Chemical Company or approved equal.

2.08 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, 1/2" asphalt-saturated cellulosic fiber.

B. Bonding Agent: ASTM C1059/C1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

C. Epoxy Bonding Adhesive: three-component, solvent-free, moisture tolerant, epoxy modified cementitious product.
   1. Product: Armatec 110 EpoCem as manufactured by Sika Corporation or specifically approved equal.
   2. Types I and II, non-load bearing Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

D. Non-Shrink Grout: Premixed compound, free of chlorides, with non-metallic aggregate, cement water reducing and plasticizing agents; capable of minimum compressive strength of 2400 psi at 48 hours and 7000 psi at 28 days. Grout shall be suitable for contact with potable water. For equipment bases and pipe supports, use non-shrink grout by Master Builders, Embeco 636, Unisorb V-1 or equal.

2.09 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
   1. Cement Binder: ASTM C150/C150M, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
   2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
   3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
   4. Compressive Strength: Not less than 4000 psi at 28 days when tested according to ASTM C109/C109M.

2.10 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
   1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland cement in concrete as follows:
   1. Fly Ash: 25 percent.
   2. Combined Fly Ash and Pozzolan: 25 percent.
   3. Ground Granulated Blast-Furnace Slag: 50 percent.
   4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent Portland cement minimum, with fly ash or Pozzolan not exceeding 25 percent.
   5. Silica Fume: 10 percent.
   6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
   7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
   8. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
   9. Admixtures: Use admixtures according to manufacturer's written instructions.
      a. Use plasticizing admixture in concrete, as required, for placement and workability.
      b. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
      c. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94 and ASTM C 1116, and furnish batch ticket information.
   1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94. Mix concrete materials in appropriate drum-type batch machine mixer.
   1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
   2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
   3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify lines, levels, and measurements before proceeding with formwork. Ensure that dimensions agree with the plans.

B. Inspect the formwork and reinforcing that it has been properly set and secured and that all items to be embedded, built-in or pass through concrete are at their proper locations and elevations.

C. Verify that concrete inserts, sleeves, and embedded elements of the project, such as conduit, and their work has been totally completed and inspected by the Owner's Representative.

D. Ensure that all points of contact with new grout are free from oil, grease and scale.

3.02 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
   1. Class A, 1/8 inch for smooth-formed finished surfaces.
   2. Class B, 1/4 inch for rough-formed finished surfaces.
      a. Hand trim sides and bottom of earth forms and remove loose soil to the satisfaction of the Owner's Representative.
      b. Remove water from forms and excavations and divert water flow to avoid washing over, under or though freshly placed concrete.

D. Construct forms tight enough to prevent loss of concrete mortar. Align form joints.

E. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.

F. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
   1. Install keyways, reglets, recesses, and the like, for easy removal.
   2. Do not use rust-stained steel form-facing material.

G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

I. Chamfer: Provide 3/4" inch chamfer on all exterior horizontal and vertical corners and edges of permanently exposed concrete.

J. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

K. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

L. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

M. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement. Do not apply form release agent where concrete surfaces are to receive special finishes or applied coatings that may be affected by the agent.

N. Where new concrete is doweled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-metallic/ non-shrink grout.

O. Prepare previously placed concrete by cleaning with steel brush and apply a Bonding Agent in accordance with the manufacturer's specifications and instructions.

3.03 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
   2. Ensure that all inserts and embedded items are not disturbed during concrete placement.

3.04 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
   1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
   2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Owner's Representative.

3.05 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.
   1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.06 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
   1. Lap joints 6 inches and seal with manufacturers recommended tape.

B. Granular Course: Cover vapor retarder with fine-graded granular material, moisten, and compact with mechanical equipment to elevation tolerances of plus 0 inch or minus 3/4 inch.

3.07 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars. Use reinforcing splices at minimum of locations and only at locations of minimum stress. Review locations of splices with Owner's Representative. Splice locations shall be approved during shop drawing review phase. Rebar splice overly shall be the minimum length as per ACI 318.
   1. Weld reinforcing bars according to AWS D1.4, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

F. Take necessary measures to ensure that reinforcement is not disturbed during the placement of concrete.

3.08 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Owner's Representative.
   1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
   2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
   3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
   4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
   5. Space vertical joints in walls as indicated or at 20' o.c. maximum. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
   6. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction / Control Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 3/16"-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
   2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
   3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

F. Ensure joint fillers and devices are not disturbed during placement of concrete.

G. Install all joint fillers and devices in accordance with the manufacturer's instructions and specifications for floor and wall finish.

H. Install joint device anchors. Maintain correct position to allow joint cover flush with floor and wall finish.

I. Install joint covers in one-piece length when adjacent construction activity is complete.

J. Apply sealants in joint devices in accordance with the manufacturer's specifications and instructions.

3.09 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Owner's Representative.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
   2. Place concrete with the aid of mechanical vibrators which are capable of transmitting to the concrete not less than 3,000 impulses per minute. Maintain at least three (3) vibrators in good working condition, ready for use when concrete placement begins in any one area.
   3. Do not interrupt successive placement. Do not permit cold joints to occur. .

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of

weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 301 and ACI 305R and as follows:

1. Maintain concrete temperature below 95 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
3. Maintain records of concrete placement. Record date, locations, quantity, air temperature and test samples taken.
4. In areas with floor drains, maintain floor elevations at walls; pitch surfaces uniformly to the drains maintaining a 1% slope.
5. Cure floor surfaces in accordance with ACI 308.
6. Apply curing compound in accordance with the manufacturer's specifications and instructions in two (2) coats with the second coat at right angles to the first.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
   1. Apply to concrete surfaces exposed to public view.

C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
   1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch 6 mm in one direction.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
   1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
   1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, and ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
   2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
      a. Specified overall values of flatness, F (F) 30; and of levelness, F (L) 20; with minimum local values of flatness, F (F) 24; and of levelness, F (L) 15; for suspended slabs.
   3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
   1. This surface shall be used for interior and exterior walking surfaces unless noted otherwise. Finish edges of exterior walkway flags with steel tooled radius edge.
   2. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, equipment pads, and elsewhere as indicated.
   1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Owner's Representative before application.

G. Slip-Resistive Finish: Before final floating, apply slip-resistive finish where indicated and to concrete stair treads, platforms, and ramps. Apply according to manufacturer's written instructions and as follows:
   1. Uniformly spread 25 lb. /100 sq. ft. of dampened slip-resistive over surface in one or two applications. Tamp aggregate flush with surface, but do not force below surface.
   2. After broadcasting and tamping, apply float finish.
   3. After curing, lightly work surface with a steel wire brush or an abrasive stone and water to expose slip-resistive aluminum granules.

H. Finish exposed concrete as specified in Division 09 specifications of this project manual.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. All exposed horizontal and vertical wall and slab corners shall have a ¾” wide chamfered edge.

D. Equipment Bases and Foundations:
   1. Coordinate sizes and locations of concrete bases with actual equipment provided.
   2. Construct concrete bases 6 inches high unless otherwise indicated; and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
   3. Minimum Compressive Strength: 4000 psi at 28 days.
   4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 12 inch centers around the full perimeter of concrete base.
   5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
   6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
   7. Cast anchor-bolt inserts into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

E. Grout: Install grout in accordance with the manufacturer's specifications and instructions. Moisten concrete and grout surfaces and allow drying until damp. Remove all standing water. Pump or inject grout into tight spaces to ensure intimate contact with the existing grout. Cure grout with an appropriate membrane in accordance with the manufacturer's specifications and instructions.

3.13 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 and ACI 305R for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb./sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
   1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
      a. Water.
      b. Continuous water-fog spray.
      c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
      a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
      b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
      c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

F. Liquid sealer/hardener to be applied on exposed concrete cured with moisture retentive or absorptive covers. The following materials provide varying levels of protection, sealant and hardness. Review products for project appropriateness.
   1. Euclid: Euco Diamond Hard (Liquid Sealer and Hardener)
   2. L&M Construction Chemicals: Seal Hard (Liquid Sealer and Hardener)
   3. Curecrete Chemical Company: Ashford Formula (Liquid Sealer and Hardener)
   4. Midwest Floor Care: Structure Formula (Liquid Sealer and Hardener)
   5. Or approved equal.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
   1. Defer joint filling until concrete has aged at least three month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by the Owner's Representative. Remove and replace concrete that cannot be repaired and patched to Owner's Representative's approval.

B. Immediately remove all rust spots that have developed during the construction period as soon as directed by the Owner's Representative. Remove all rust spots that have formed by the use of temporary handrails.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a special inspector and/or qualified testing and inspecting agency to perform field tests and inspections and prepare test reports. Contractor is responsible to notify the Owners representative at least 72 hours prior to the scheduled work that requires inspection / testing. The presence of the Inspector engaged by the Owner does not relieve the contractor of Quality Control Requirements.

B. Testing and Inspecting: Engage and pay all costs for a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:
   1. Steel reinforcement placement.
   2. Headed bolts and studs.
   3. Steel reinforcement welding.
   4. Concrete placement, including conveying and depositing.
   5. Curing procedures and maintenance of curing temperature.
   6. Verification of concrete strength before removal of shores and forms from beams and slabs.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
   1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
      a. Frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
      b. One (1) additional test cylinder shall be taken during cold weather and be cured under the same conditions as the concrete it represents.
   2. Slump: ASTM C 143; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
   3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   4. Concrete Temperature: ASTM C 1064; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
   5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
   6. Compression Test Specimens: ASTM C 31.
      a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

b. Cast and field cure two Insert number sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
   a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
   b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi .
10. Test results shall be reported in writing to Owner's Representative, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7 and 28-day tests.
11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Owner's Representative but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Owner's Representative. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42 or by other methods as directed by the Owner's Representative.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

A. Section Includes:
   1. Metal floor plate and supports.

1.03 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of metal fabrications that are anchored to or that receive other work. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.04 ACTION SUBMITTALS

A. Product Data: For the following:
   1. Grout.
   2. Anchors

B. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:

1.05 INFORMATIONAL SUBMITTALS

A. Qualification Data: For professional engineer.

B. Welding certificates.

1.06 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
   2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."

1.07 FIELD CONDITIONS

A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on the shop drawings.
   1. Established dimensions: Where field measurements cannot be made without delaying the work, establish dimensions and proceed with fabricating metal fabrications without field

measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond with established dimensions.

PART 2 - PRODUCTS

2.01 METALS

A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

B. Steel Plates, Shapes, and Bars: ASTM A36/A36M.

C. Rolled-Steel Floor Plate: ASTM A 786, rolled from plate complying with ASTM A36/A36M or ASTM A283/A283M, Grade C or D.

D. Steel Pipe: ASTM A53, Standard Weight (Schedule 40) unless otherwise indicated.

E. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

F. Aluminum Extrusions: ASTM B308, Alloy 6063-T5 or 6.

G. Aluminum Sheet: ASTM B209, Alloy 5005-H34.

H. Aluminum Castings: ASTM B26/B26M, Alloy 443.0-F.

2.02 FASTENERS

A. General: Unless otherwise indicated, provide Type 316 stainless-steel fasteners.
   1. Provide stainless-steel fasteners for fastening aluminum.

B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts; and, where indicated, flat washers.

C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM A666; with hex nuts; and, where indicated, flat washers; Alloy Group 2.

D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and flat washers.
   1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.

E. Plain Washers: Round, ASME B18.22.1.

F. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.

G. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A47/A47M malleable iron or ASTM A27/A27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.

H. Post-Installed Anchors: Torque-controlled expansion anchors .

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.03 MISCELLANEOUS MATERIALS

A. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

E. Non-shrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, non-gaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

F. Concrete: Comply with requirements in Section 033000 - INFORMATION FOR BIDDERS for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 4000 psi.

2.04 FABRICATION, GENERAL

A. Shop Assembly: Pre-assemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

C. Form exposed work with accurate angles and surfaces and straight edges.

D. Weld corners and seams continuously to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.

F. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

G. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.

H. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.05 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.

B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
   1. Fabricate units from slotted channel framing where indicated.

C. Galvanize miscellaneous framing and supports where indicated.

2.06 METAL FLOOR PLATE

A. Fabricate from rolled-steel floor abrasive-surface floor plate of thickness indicated below:

B. Provide steel angle supports as indicated.

C. Provide flush steel bar drop handles for lifting removable sections, one at each end of each section.

2.07 FINISHES, GENERAL

A. Finish metal fabrications after assembly.

B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.08 STEEL AND IRON FINISHES

A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A153/A153M for steel and iron hardware and with ASTM A123/A123M for other steel and iron products.
   1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

2.09 ALUMINUM FINISHES

A. As-Fabricated Finish: AA-M12.

PART 3 - EXECUTION

3.01 EXAMINATION

A. If substrate preparation is the responsibility of another installer, notify the Owner's Representative of unsatisfactory preparation before proceeding.

B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.02 INSTALLATION, GENERAL

A. Install all factory-fabricated items in accordance with the manufacturer's specifications and recommendations.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges

and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.

C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.

D. Field Welding: Comply with the following requirements:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

E. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, and other connectors.

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

G. Corrosion Protection: Coat concealed surfaces of aluminum that come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
   1. Cast Aluminum: Heavy coat of bituminous paint.

3.03 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

B. Anchor supports for securely to, and rigidly brace from, building structure.

C. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

3.04 PROTECTION

A. Protect installed products until completion of project.

3.05 ADJUSTING AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with 1.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aluminum pipe and tube railings.

B. Vandal guard.

C. Safety gate.

1.02 RELATED SECTIONS

A. Section 055000 – Metal Fabrications.

B. Section 055213 – Aluminum Pipe and Tube Railings.

C. Section 118129 - Facility Fall Protection

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Building Code of New York State.

C. ANSI/ASCE 7 – Minimum Design Loads for Buildings and Other Structures.

D. American Welding Society (AWS) D1.2/D1.2M – Structural Welding Code – Aluminum.

E. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM B 221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

G. ANSI A14.3 – Ladders-Fixed Safety Requirements.

H. OSHA 1910.27 – Fixed Ladders.

1.04 DESIGN REQUIREMENTS

A. Fabricate ladder assembly to support concentrated live load of 250 lb (1100 N) acting anywhere on the ladder with a maximum deflection of 1/240 of span and without damage of permanent set.

B. Fabricate ladder assembly to support concentrated live load of 80 lb (350 N) acting on each rung simultaneously with a maximum deflection of 1/240 of span and without damage of permanent set.

C. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.05 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings
   1. Include plans, elevations, sections, details, and attachments to other work.

2. Indicate profiles, sizes, connections attachments, reinforcing, anchorage, fastener size and type and accessories.
3. Provide reaction loads for each hanger and bracket.

C. Product Information: Provide manufacturer's product brochure and specifications.

1.06 QUALITY ASSURANCE

A. Obtain all ladder materials from a single manufacturer.

B. Prepare shop drawings under the direct supervision of a licensed Professional Engineer experienced in design of this work and licensed in the State of New York. The submitted shop drawings shall bear this seal and signature.

C. Welding Qualifications: Qualify procedures and personnel according to the following:
1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 016500.

B. Fabricate and deliver products to the site in largest sections as practical.

C. Do not handle products in a manner that will damage or distort materials.

D. Do not store materials directly on the ground.

1.08 FIELD MEASUREMENTS

A. Field verify all required measurements and actual locations of structural anchorage members before fabrication.

1.09 COORDINATION

A. Coordinate work under provisions of Section 013100.

B. Coordinate installation of ladder with the installation of other accessories that are to be attached to the ladder.

C. Schedule installation so substrate attachments are made only to completed substrates.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:
1. O'Keeffe's, Inc., Brisbane CA.
2. Precision Ladders, LLC, Morristown TN.
3. Or approved equal.

2.02 LADDER TYPE

A. Exterior tank ladder: Tubular rail access ladder with walk through rail extension.

B. Interior tank ladder: Heavy duty tubular rail fixed ladder.

2.03 MATERIALS

A. Aluminum Sheet: Alloy 5005-H34 to comply with ASTM B 209.

B. Aluminum Extrusions: Alloy 6063-T6 to comply with ASTM B 221.

2.04 FABRICATION

A. Rungs:
   1. Fabricate ladder with rungs spaced 12-inches on center. Minimum rung length to be 18-inches (clearance between side rails).
   2. Section of rungs shall be less than 1-inch, formed from tubular aluminum extrusions. Rung shall be slip resistant.
   3. Rungs shall withstand a 1,500-pound load without deformation or failure.

B. Install attachment hardware such that the centerline of the ladder rungs is a minimum of 7-inches from any structure, measured perpendicular to the ladder.

C. Side Rails:
   1. Assembled from two interlocking aluminum extrusions no less than 1/8-inch wall thickness by 3-inches wide.
   2. Construction shall be self-locking stainless-steel fasteners, full penetration welds, and clean, smooth, and burr-free surfaces.
   3. Extend siderails a minimum of 42-inches above any platforms, landings, or as otherwise indicated on the drawings. Walkthrough rail and roof rail extensions shall be fitted with tubular grabrails.

2.05 ALUMINUM FINISHES

A. Clear Anodic Finish: AA-M10C22A41 (architectural class, 0.018 mm or thicker).

2.06 ACCESSORIES

A. Ladder Vandal Guard: 8-foot tall aluminum vandal guard by RB Industries with stainless-steel hardware.

B. Ladder Safety Gate: Stainless-steel self-closing safety gate, Cotterman Model AG2440S with stainless-steel hardware.

C. Ladder Safety Climb: See Section 108905 – Climbing Safety Device.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that field conditions are acceptable and are ready to receive work.

3.02 INSTALLATION

A. Install in accordance with manufacturer’s instructions.

B. Install items plumb and level, accurately fitted, free from distortion or defects.

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Provide anchors, plates, angles, hangers, and struts required for connecting ladder to structure.

E. Obtain Owner's Representative's approval prior to field cutting or making adjustments not scheduled.

3.03 ADJUSTING AND CLEANING

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

3.04 TOLERANCES

A. Maximum variation from plumb: ¼-inch in 10-feet, non-cumulative.

B. Maximum offset from true alignment: ¼-inch.

3.05 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Aluminum pipe and tube railings.

1.02 RELATED SECTIONS

A. Section 055000 – Metal Fabrications.

B. Section 055133.19 – Aluminum Ladders

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Building Code of New York State.

C. ANSI/ASCE 7 – Minimum Design Loads for Buildings and Other Structures.

D. American Welding Society (AWS) D1.2/D1.2M – Structural Welding Code – Aluminum.

E. ASTM B 209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.

F. ASTM B 221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes.

1.04 DESIGN REQUIREMENTS

A. Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials in accordance with ANSI/NAAMM AMP 521 - latest edition and based on the following:
   1. Aluminum: The lesser of minimum yield strength divided by 1.65 or minimum ultimate tensile strength divided by 1.95.

C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
      b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
      c. Uniform and concentrated loads need not be assumed to act concurrently.
   2. Infill of Guards:
      a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
      b. Infill load and other loads need not be assumed to act concurrently.

D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

E. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.05 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings
   1. Include plans, elevations, sections, details, and attachments to other work.
   2. Indicate profiles, sizes, connections attachments, reinforcing, anchorage, fastener size and type and accessories.
   3. Provide reaction loads for each hanger and bracket.

C. Product Information: Provide manufacturer's product brochure and specifications.

1.06 QUALITY ASSURANCE

A. Obtain all pipe, tube, connectors, etc. from a single manufacturer.

B. Prepare shop drawings under the direct supervision of a licensed Professional Engineer experienced in design of this work and licensed in the State of New York. The submitted shop drawings shall bear this seal and signature.

C. Welding Qualifications: Qualify procedures and personnel according to the following:
   1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum".

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 016500.

B. Fabricate and deliver products to the site in largest sections as practical.

C. Do not handle products in a manner that will damage or distort materials.

D. Do not store materials directly on the ground.

1.08 FIELD MEASUREMENTS

A. Field verify all required measurements and actual locations of structural anchorage members before fabrication.

1.09 COORDINATION

A. Coordinate work under provisions of Section 013100.

B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including anchor bolts, and items with integral anchors.

C. Schedule installation so substrate attachments are made only to completed substrates. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers:
   1. Holleander Speed-Rail System
   2. Or approved equal.

2.02 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.03 ALUMINUM

A. Aluminum, General: Provide alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than the strength and durability properties of alloy and temper designated below for each aluminum form required.

B. Extruded Bars and Tubing: ASTM B 221, Alloy 6063-T5.

C. Pipe and Round Tubing: ASTM B 429, Alloy 6061-T6, ASTM B 221, Alloy 6005-T5.

D. Drawn Seamless Tubing: ASTM B 210, Alloy 6063-T832.

E. Plate and Sheet: ASTM B 209, Alloy 6061-T6.

F. Die and Hand Forgings: ASTM B 247, Alloy 6061-T6.

G. Castings: ASTM B 26/B 26M, Alloy 535.

H. Panel Clips: Alloy 6063-T6.

2.04 FASTENERS

A. Type 316 stainless-steel fasteners.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads. ASTM E 894.

C. Fasteners for Interconnecting Railing Components:
   1. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless otherwise indicated.
   2. Provide concealed fasteners for interconnecting railing components and for attaching them to other work, unless exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
   3. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 2 (A4) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.05 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
   1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

C. Non-shrink, Non-metallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.

D. Anchoring Cement: Factory-packaged, non-shrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
   1. Water-Resistant Product: At exterior locations and where indicated, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.06 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove flux immediately.
   4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

I. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.

J. Form changes in direction as follows:
   1. As detailed.

K. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

L. Close exposed ends of railing members with prefabricated end fittings.

M. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.

N. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
   1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers, or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

O. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

2.07 FINISHES - GENERAL

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.08 ALUMINUM FINISHES

A. Clear Anodized Finish: AA-M10C22A41 (architectural class, 0.7 mil or thicker).

B. Fittings shall be an architectural tumbled mill finish.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine construction to ensure that aluminum support angles are in place to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

3.02 INSTALLATION

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
   1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
   2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening: Use anchorage devices and fasteners for securing railings and for properly transferring loads to adjoining support structure.

3.03 RAILING CONNECTIONS

A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

B. Expansion / Slip Movement Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inches (50 mm) beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches (150 mm) of post.

3.04 ANCHORING POSTS

A. Form or core-drill holes not less than 5 inches (125 mm) deep and 3/4 inch (20 mm) larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with non-shrink, non-metallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Leave anchorage joint exposed with 1/8-inch (3-mm) buildup, sloped away from post.

C. Anchor posts to metal surfaces with circular flanges floor type as required by conditions, connected to posts and to metal supporting members as follows:
   1. For aluminum pipe railings, attach posts using fittings designed and engineered for this purpose.

3.05 ADJUSTING AND CLEANING

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

3.06 PROTECTION

A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Tank roof vent.

1.02 REFERENCES

A. AWS A2.0 - Standard Welding Symbols

B. AWS D1.0 - Code for Welding in Building Construction

C. AWS D1.1 - Structural Welding Code

1.03 DESIGN REQUIREMENTS

A. Minimum capacity: 1,000 CFM

1.04 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop drawings: Indicate profiles, sizes, connection attachments, reinforcing, size and type of fasteners, and accessories. Indicate welded connections using AWS A2.0 welding symbols.

1.05 QUALITY ASSURANCE

A. Fabricate vent in accordance with AWS D1.0 and AWS D1.1.

B. Maintain one (1) copy of each document on site.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products to the site under provisions of Sections 016500.

B. Fabricate and deliver products to the site in largest sections practical.

C. Do not handle vent in a manner which will damage or distort vent.

D. Do not store vent directly on the ground.

1.07 FIELD MEASUREMENTS

A. Verify that field measurements are as indicated on approved shop drawings.

1.08 COORDINATION

A. Coordinate work under provisions of Section 013100.

B. Coordinate installation of vent with fabrication of substrate and all other adjacent work.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Vent: Fully weatherproof and freezeproof; aluminum construction; designed to prevent the ingress of birds, animals, insects, dust, and water.

2.02 FABRICATION

A. Fabricate vent to be freeze proof and to provide sufficient air capacity during maximum rate of inflow or outflow of water to the tank so that dangerous pressures do not develop.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing plate or opening in tank roof to accommodate new vent.

B. Install saucer plate or opening in tank roof to accommodate new vent.

C. Verify tank shell is ready to receive work of this section.

3.02 INSTALLATION

A. Install roof vent in accordance with approved shop drawings.

B. Install roof vent vertical and plumb.

END OF SECTION

PART 1 - GENERAL

1.01 SCOPE

A. Climbing safety device.

1.02 REFERENCES

A. OSHA 1910.27.

B. ANSI A14.3.

1.03 SYSTEM DECRIPTION

A. Fall protection for climbing elevated tank ladders which allows the climber hands-free operation whether ascending or descending.

1.04 SUBMITTALS

A. Product data.

B. Manufacturer's installation instructions.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. LAD-SAF Vertical Climbing Safety System, 3M DBI/SALA.

B. Harness/Lanyard System, Petzl.

C. Guardian Fall Protection Lanyard System.

D. Or approved equal.

2.02 COMPONENTS

A. Standard Rung Mount Vertical Climbing Safety System:
   1. Lad-Saf top mounting bracket, type 304 stainless steel with single point anchor, type 316 stainless steel. Model 616613.
   2. Lad-Saf bottom mounting bracket, type 304 stainless steel with integrated tension indicator.

B. Cable:
   1. Lad-Saf 3/8” 7 x 19, type 304 stainless steel safety cable with pre-swaged cable termination. Model 6107XXX.

C. Cable Guide:
   1. Lad-Saf ladder rung mounted cable guide, type 304 stainless steel, installed a maximum of every 25-feet. Provide a minimum of one cable guide for each system regardless of total length.

D. Cable Sleeve:
   1. Two (2) Lad-Saf flexible sleeves, stainless steel, type X3 cable sleeves for 3/8" (9.5mm) climbing cable. Model 6160054.

E. Two (2) full body harnesses, Avao Bod Fast, Model C71AFN U, size 0, 1, or 2 as requested by Owner.

F. Two (2) lanyard's, Guardian double leg internal shock absorbing lanyards with rebar hooks, model 11203 IS-72-2R-6.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install in accordance with manufacturer's installation instructions.

B. Install dielectric insulation kits when affixing dissimilar metals.

C. Install 1/4-inch thick red rubber isolators where safety climb system components are affixed to ladder rungs.

3.02 DEMONSTRATION

A. Demonstrate operation of system to Owner.

B. Provide a two (2) hour in-field demonstration of climbing safety device to Owner's personnel.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe hangers for various installed pipe systems.

1.02 SUBMITTALS

A. Submit under provisions of Section 013300

1.03 REFERENCES

A. Underwriters Laboratories - UL Listing.

B. ASTM B633 - Specification for Electrodeposited Coatings of Zinc on Iron and Steel

C. ASTM A123 - Specification for Zinc (Hot-Galvanized) Coatings on Products Fabricated from Rolled, Pressed, and Forged Steel Shapes, Plates, Bars, and Strip

D. ASTM A653 - Specification for Steel Sheet, Zinc-Coated by the Hot-Dip Process

E. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability (Formerly ASTM A570)

F. MSS SP58 - Manufacturers Standardization Society: Pipe Hangers and Supports- Materials, Design, and Manufacture

G. MSS SP69 - Manufacturers Standardization Society: Pipe Hangers and Supports- Selection and Application

H. MSS SP89 - Pipe Hangers and Supports - Fabrication and Installation Practices

1.04 QUALITY ASSURANCE

A. Hangers and supports used in fire protection piping systems shall be listed and labeled by Underwriters Laboratories.

B. Steel pipe hangers and supports shall have the manufacturers name, part number, and applicable size stamped in the part itself for identification.

C. Hangers and supports shall be designed and manufactured in conformance with MSS SP 58.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Anvil International (Grinnell)

B. Cooper B-Line, Inc.

C. Carpenter and Patterson

D. Fee and Mason

E. Hilti

F. Elcen

G. Piping Technology and Products, Inc.

H. Or Approved Equal

2.02 MATERIALS

A. Pipe Hangers & Supports:
   1. All pipe hangers and supports for stainless steel piping systems shall be of stainless steel construction.
   2. All pipe hangers and supports for copper tubing piping systems shall be of stainless steel construction. Provide dielectric/isolation wrapping or pipe insulation where dissimilar metals meet.
   3. All pipe hangers and supports for black iron piping systems shall be of stainless steel construction. Provide dielectric/isolation wrapping where dissimilar metals meet.
   4. All pipe hangers and supports for PVC piping systems shall be of galvanized steel construction, except where piping is used for chemical treatment.
   5. All pipe hangers and supports for chemical lines including [sodium] [calcium] hypochlorite and caustic soda shall be of stainless steel construction.
   6. All pipe hangers and supports for chemical lines including brine solution and regenerate piping shall be of stainless steel construction.
   7. All pipe hangers and supports for Rigid galvanized piping systems shall be of galvanized steel construction.

B. Trapeze Hangers: Where three or more non-chemical lines of pipe run parallel, support them with galvanized trapeze hangers, Grinnell Figure 46. Trapeze to be supported by a minimum of two galvanized rods with Figure 60 washer plates. For top loading only.

C. Concrete Inserts: Anvil International Figure 282, MSS SP-58 (Type 18), galvanized, universal concrete inserts, adequately sized and correctly positioned to support full load operating systems.

D. C-Clamps: Anvil International Figure 86, MSS SP-58 (Type 23) galvanized with set screw and lock nut. Use these for attaching hangers to steel beams. Welding hanger rods to steel members is not permitted. Provide retaining clip for C-Clamps.

E. Malleable Beam Clamps: Anvil International Figure 218, MSS SP-58 (Type 30), galvanized. Use these for attaching hangers to bar joists. Provide retaining clip for all beam clamps.

F. Clevis Hangar (4" diameter Piping or Less): Anvil International Figure 67, MSS SP-58 (Type 5), galvanized. Use these for attaching hangers to bar joists, column or wall.

G. Clevis Hanger (4" diameter or Greater D.I. Piping): Anvil International Figure 590, MSS SP-58 (Type 1), galvanized.

H. Pipe saddle support: Pipe saddle with U-bolt and threaded pipe adjuster. Cooper B-Line Figure 318A, MSS SP-69 (Type 37), stainless steel. Pipe stand: Cooper B-Line Figure 316T, stainless steel.

I. All hangers and supports shall be UL Listed. Cooper B-Line Figure 318A & 316T,

J. Provide threaded rod in accordance with manufacturer instruction.

2.03 FINISHES

A. Outdoor and Corrosive Area Finishes
   1. Hangers and strut located outdoors shall be Type 316 stainless steel. All hanger hardware shall be stainless steel.
   2. Provide dielectric/isolation wrapping in systems of dissimilar metals.

PART 3 - EXECUTION

3.01 SCHEDULES - HANGER SPACING

A. Copper Pipe
   1. Not more than 10'-0" o.c.

B. Stainless Steel Pipe
   1. Not more than 15'-0" o.c.

C. Ductile Iron Piping
   1. As shown on contract drawings

3.02 INSTALLATION

A. Support pipes on specified hangers so that equipment, pumps, and fittings do not bear weight of pipe.

B. Do not use perforated metal, strap iron, or band iron.

C. Do not make offsets in hangers.

D. Maximum allowable spacing of pipe hangers for horizontal piping is listed above. Space hangers and brackets at close intervals where necessary to maintain levels, slopes, and drainage, or to prevent sagging.

E. Place hangers within 12 inches of each horizontal elbow.

F. Use hangers with 1-1/2 inch minimum vertical adjustment.

G. Where several pipes can be installed in parallel and at same elevation, provide multiple or trapeze hangers.

H. Allow for forces imposed by expansion joints, satisfy structural requirements and maintain proper clearances with respect to adjacent piping, equipment and structures. Hangers for insulated pipes shall be sized to accommodate insulation thickness.

I. Support cast iron pipe under each section and at each hub.

J. Keep the different types of hangers to a minimum and provide hangers that are neat, without complicated bolting and with the number of parts of each hanger and its anchor kept to a minimum.

K. Make accurate weight balance calculations to determine the required supporting forces at each hanger or support location and the pipe weight load at each equipment connection.

L. Pipe hangers shall be capable of supporting the pipe in all conditions of operation. They shall allow free expansion and contraction of the piping, and prevent excessive stress resulting from transferred weight being induced into the pipe or connected equipment.

M. Provide means of preventing dissimilar metal contact such as plastic coated hangers, copper colored epoxy paint, or non adhesive isolation tape- B-Line Iso-pipe. Galvanized felt isolators sized for copper tubing may also be used, B-Line B3195CT.

N. Support horizontal cast iron pipe adjacent to each hub.

O. Install hangers to provide a minimum of 1/2 inch space between finished covering and adjacent work.

P. Place a hanger within 12 inches of each horizontal elbow.

Q. Support Provide neoprene protection where dissimilar metals come into contact.

R. Maximum allowable spacing of pipe supports for vertical piping independently of connected horizontal piping. Support vertical pipes at every floor. Wherever possible, locate riser clamps directly below pipe couplings or shear lugs.

S. Where several pipes can be installed in parallel and at the same elevation, provide trapeze hangers as specified. Trapeze hangers shall be spaced according to the smallest pipe size, or install intermediate supports according to schedule in section 3.01B.

T. Do not support piping from other pipes, ductwork or other equipment that is not building structure.
   1. Where horizontal piping movements are greater than 1/2 inch, or where the hanger rod angularity from the vertical is greater than four degrees from the cold to hot position of the pipe, the hanger pie and structural attachments shall be offset in such a manner that the rod is vertical in the hot position.

U. In the part of the building which is steel-framed, attach hangers to the building structural steel beams. Where hangers do not correspond with the building structural steel beams, provide supplemental steel members continuously welded or bolted to the building structural steel beams.

V. In the parts of the building which is a concrete structure, attach hangers to the concrete structure by installing anchors into the concrete.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavation and backfill for electrical work.

B. Primary power wiring and distribution system.

C. Wiring devices.

D. Electrical control systems and interlock wiring.

E. Wiring for built-in equipment.

F. Distribution panels and switches.

G. Instrumentation and Controls.

1.02 RELATED WORK

A. Foundations and pads required for equipment furnished under this division of specifications.

B. Field painting, except such painting as is required to maintain shop coat painting and factory finish painting.

C. Flashing and sealing of conduits through outside walls.

D. Cutting and patching for electrical work, except for errors and omissions under this Division.

1.03 QUALITY ASSURANCE

A. It is understood that the rights and benefits given the Owner by the guarantees found in the technical specifications are in addition to and not in derogation of any rights or benefits found in the special and general provisions of the contract.

B. Electrical equipment provided under this Division shall be turned over in operating condition. Instruction on further operation and maintenance shall be included in the operating and maintenance instructions.

1.04 REFERENCES

A. Perform work in accordance with standards listed below. Where these specifications are more stringent, they take precedence. In case of conflict, obtain a decision from the Owner's Representative.
   1. NFPA-70: National Electrical Code
   2. NFPA-101: Life Safety Code
   3. New York State Energy Code
   4. New York State Building Code
   5. Applicable New York State Administrative Code
   6. Applicable Town Ordinances.
   7. Electric utility rules and regulations.
   8. Telephone utility rules and regulations.

1.05 PERMITS AND FEES

A. Obtain and pay for all permits, construction charges, fees, licenses, certificates, inspections and other use charges required in connection with the work.

B. Such permits include, but are not limited to:
   1. Transportation and disposal of debris.
   2. Electrical Inspectors, Inc., or a pre-approved electrical inspection agency.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. All materials and equipment used in carrying out these specifications shall have UL listing and label. Specifications and drawings indicate name, type, or catalog numbers of materials and equipment to be used as standards. Proposals shall be based on these standards. Contractor may use materials and equipment equivalent to those specified, subject to Owner's Representative's approval.

PART 3 - EXECUTION

3.01 COORDINATION

A. Carefully examine specifications, drawings and project site to be thoroughly familiar with items which require electrical connections and coordination. Electrical drawings are diagrammatic and shall not be scaled for exact sizes.

B. Notify other Contractors of any deviations or special conditions necessary for the installation of work. Interferences between work of various contractors to be resolved prior to installation. Work installed not in compliance with specifications and drawings and without properly checking and coordinating as specified above shall, if necessary, be removed and properly reinstalled without additional cost to the Owner. Owner's Representative to be mediating authority in all disputes arising on project.

C. Equipment shall be installed in accordance with manufacturer's recommendation. Where conflicts occur between contract documents and these recommendations, a clarification shall be requested of the Owner's Representative for decision before preceding with such work.

D. Insofar as it is possible to determine in advance, advise masonry tradesmen to leave proper chases and openings. Place all outlets, anchors, sleeves, and supports prior to pouring concrete or installation of masonry work. Should the Contractor neglect doing this, any cutting and/or patching required to be done is at this Contractor's expense.

3.02 CUTTING AND PATCHING

A. Repair or replace routine damage caused by cutting in performance of work under this Division.

B. Correct unnecessary damage caused due to installation of electrical work, brought about through carelessness or lack of coordination.

C. Holes cut through floor slabs to be core drilled with drill designed for this purpose. All openings, sleeves, and holes in slabs to be properly sealed, fire proofed and waterproofed.

D. Repairs to be performed with materials which match existing materials and to be installed in accordance with appropriate sections of these specifications.

3.03 TESTS

A. On completion of work, installation shall be completely operational and entirely free from ground, short circuits, and open circuits. Perform a thorough operational test in presence of the Owner's Representative. Balance all circuits so that feeders to panels are not more than 10% out of balance between phases with all available load energized and operating. Furnish all labor, materials and instruments for above tests.

B. Furnish the Owner's Representative with a copy of such tests including identification of each circuit and readings recorded, also the main service ground resistance test as described in Section 260526 of these specifications. Test information to include ampere readings of all panels and major circuit breakers, isolation resistance reading of motors and transformers.

3.04 IDENTIFICATION OF EQUIPMENT

A. Properly identify the following:
   1. Distribution panels.
   2. Disconnect switches.

B. Use permanently attached black phenolic plates with 1/4-inch white engraved lettering on the face of each, attached with two sheet metal screws.

C. Panelboard identification plates shall indicate panel by name.

3.05 INSTALLATION

A. The Contractor shall carefully move and replace existing equipment, appliances and all related items, as required to conduct proposed work.

B. Install and conduct all work per applicable NEC, State and local codes.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wires and cables.

B. In general, the wires and cables included under this Section shall include, but not be limited to, the following:
   1. 600V power and control cable
   2. Instrumentation wires
   3. Communication cables

C. All conductors to be continuous from origin to panel or equipment termination without splices.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

B. NECA Standard of Installations.

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

1.04 QUALITY ASSURANCE

A. Products used in the work of this Section shall be produced by manufacturers regularly engaged in the manufacturing, installing and servicing of similar items with a history of successful production acceptable to the Owner's Representative as specified herein and in accordance with the General Conditions.

B. Submit the following information pertaining to the manufacturer(s):
   1. Complete literature, performance, and technical data describing the proposed equipment and listing of items made by the manufacturer.
   2. Location of closest service office from which this equipment shall be serviced.
   3. Location of closest parts inventory for item installation.

1.05 COORDINATION

A. Coordination:
   1. Coordinate wire and cable required with the equipment being furnished by others for the satisfactory operation of the equipment or system.
   2. Review installation procedures under other sections and contracts and coordinate them with the work specified herein.
   3. Notify other prime contractors in advance of the installation of the work included to provide them with sufficient time for installation and coordination of interrelated items that are included in their contracts and that must be installed in conjunction with the work included in this Section.

1.06 PROJECT CONDITIONS

A. Verify that embedded conduit, in masonry and concrete, is installed as shown on the Drawings prior to the work being enclosed by others.

B. Conductor sizes are based on copper at 75°C.

C. Wire and cable routing shown on Drawings is approximate unless dimensioned or specifically called for such as where conduit is to be embedded in concrete or masonry. Route wire and cable as required to meet project conditions and shall be routed above ceilings, directly under joists, in pipe trenches, where available, and in masonry. Where exposed conduit is permitted, it shall be run to maximize wall space.

D. Field verify destination location to determine cable routing.

E. Where wire and cable routing is not shown for proposed destination, determine exact routing and lengths required. Routing shall be reviewed with the Owner's Representative.

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Install products in accordance with manufacturer's recommendations.

B. Single copper conductors with 600-volt insulation.

C. Minimum size of feeder conductors and grounds shall be No. 12 AWG.

D. Insulation: No. 12 AWG and No. 10 AWG, provide ANSI/NFPA 70, Type THWN-2 for conductors installed interor of building. Provide ANSI/NFPA70, type XHHN-2 for conductors installed on exterior.

E. Use solid conductor for feeder and branch circuits, 10 AWG and smaller.

F. All conductors shall include complete set of manufacturer's markings for insulation and conductor size.

G. Manufacturers shall be ANACONDA, TRIANGLE, ROME, or approved equal.

H. Provide white colored neutral conductors; provide black, color coded phase conductors; provide green colored ground conductors.

2.02 4-PAIR CATEGORY 6E UNSHIELDED TWISTED PAIR CABLE

A. Manufacturers: Subject to compliance with project requirements, manufacturers offering Products which may be incorporated in the Work include the following:
   1. Belden Corporation, Carmel, IN (800) 246-2673.
   2. Avaya, Basking Ridge, NJ (800) 344-02232.
   3. Berk-Tek, Incorporated, New Holland, PA (800) 237-5835.
   4. CommScope, Hickory, NC (800) 982-1708.
   5. Draka Comteq, Franklin, MA (888) 541-7100.
   6. General Cable, Highland Heights, KY (800) 424-5666.
   7. Mohawk/CDT Leominster, MA (978) 537 9961.
   8. NORDX/CDT, Worcester, MA (800) 331-0779.
   9. Superior Essex, Atlanta, GA. (800) 685-4887.
   10. Tyco Electronics, Harrisburg, PA (800) 522-6752.

B. Conductors: 4 twisted pair - 24 AWG, solid copper w/ RJ-45 connector ends
   1. Individually insulated plenum rated conductors under common plenum rated sheath unless entire cable is installed within conduit/EMT or if area where cable is installed is not considered a return air plenum according to any applicable codes.

2. Complies with individual characteristics established in ANSI/TIA/EIA-568-B, and all addendums for Category 6E cable performance specification.
3. Overall Nominal Diameter: .365 x .165 in.
4. Nominal Impedance: 100 ohms plus or minus 15 percent.
5. Certified capable of performing to minimum 350 MHz.

C. Mechanical Characteristics
1. Operating temperature: -20°C to +80°C
2. Bulk cable weight: 29 lbs./1000 ft.
3. Maximum recommended pulling tension: 45 lbs.
4. Minimum bend radius: 1 in.

D. Flame test: UL1666 Riser

E. Electrical Characteristics:
1. Nom. Mutual Capacitance @ 1 KHz 15.0 pF/ft
2. Maximum Capacitance Unbalance (pF/100 m) 49.2 pF/100 m
3. Nominal Velocity of Propagation 70 %
4. Maximum Delay (ns/100 m) 510 @ 100MHz ns/100 m
5. Maximum Delay Skew (ns/100m) 25 ns/100 m
6. Maximum Conductor DC Resistance @ 20 Deg. C 9 Ohms/100 m
7. Maximum DCR Unbalance @ 20 Deg. C 3 %
8. Max. Operating Voltage - UL 300 V RMS

2.03 MECHANICAL CONNECTORS

A. Conductor tapping connectors shall be BURNDY Servit split bolt, Series KS and KS3, or approved equal.

B. Split bolt connectors shall use BURNDY Type SC Servit cover on indoor applications.

C. Terminal lugs shall be BURNDY Universal Terminal Series. Terminal lugs shall be sized for proper ampacity and proper number of conductor holes. Each conductor shall occupy only one hole on a terminal lug.

D. Conductor tapping connectors for multiple conductors shall be BURNDY Series V-Tap with V-Tap covers, and V-Blok mounting platforms.

2.04 BELOW GRADE EXTERIOR SPLICES

A. Manufacturer: 3M or approved equal

B. Model: 72-N series for inline splices

C. Model: 90-B1 for WYE splices

D. Splices shall be weatherproof, made with epoxy resin UL listed for direct burial.

E. For use with all exterior pull boxes and hand holes where splices are made.

F. Provide all connectors and crimp couplings as required.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Make terminations in accordance with cable manufacturers instructions for the particular type of wire and cable.
   2. Splices are not allowed in the underground duct and manhole systems. If splices are required, the Contractor shall obtain approval in writing from the Owner's Representative prior to splicing.
   3. All splices shall be in made in terminal boxes.

B. Wire and Cable Sizes: The sizes of wire and cable shall be as shown on the Contract Drawings, or if not shown, as approved by the Owner's Representative. Minimum size wire shall be No. 12 AWG for all power, lighting and receptacle circuits. Wires for control circuits shall be No. 14 AWG minimum. Wire for instrumentation circuits shall not be smaller than No. 16 AWG. If due to field routing the voltage drop exceeds 2.5%, the size of conductors shall be increased such that 2.5% is the maximum voltage drop incurred.

C. Number of Wires: The number of wires indicated on the Contract Drawings for the various control, indications, and metering circuits were determined for general schemes of control and for particular indication and metering systems. Coordinate wiring schemes with equipment schematics.

D. Wiring Identification: All wiring shall have a unique wire number and be labeled at both ends. Wire numbers shall correspond with the equipment terminal wire numbers. Where no wire numbers are indicated, the Contractor shall assign wire numbers. Wire numbers shall not be duplicated.

E. Cable Identification Tags: Furnish all labor and materials and affix in a permanent way to each cable in manholes, cable compartments and vaults, junction boxes, pull boxes and points of termination, a laminated plastic tag, bearing clearly printed, the cable number indicated on the Contract Drawings or some other approved identification number or symbol. All cables shall be temporarily tagged with its full ID number immediately after it has been pulled.

F. Wiring Supplies: Only electrical wiring supplies manufactured under high standards of production and meeting the approval of the Owner's Representative shall be used. Friction tape shall be in accordance with ASTM D69.

G. Training of Cable: Furnish all labor and material required to train cables around cable vaults within buildings and in manholes in any outdoor underground duct system. Sufficient length of cable shall be provided in each manhole and vault so that the cable can be trained and racked in an approved manner. In training or racking, the radius of bend of any cable shall be not less than the manufacturer's recommendation. All manhole cables shall be arc and fireproofed.

H. Connections at Control Panels, Limit Switches and Similar Devices:
   1. Where stranded wires are terminated at panels, and/or devices connections shall be made by solderless lug, crimp type ferrule or solder dipped.
   2. Where enclosure sizes and sizes of terminals at limit switches, solenoid valves, float switches, pressure switches, temperature switches, and other devices make 7-strand, No. 12 AWG, wire terminations impractical, the Contractor shall terminate external circuits in an adjacent junction box of proper size and shall install No. 14 AWG stranded wires to the junction box in a conduit.

I. Pulling Temperature: Cable shall not be flexed or pulled when the temperature of the insulation or of the jacket is such that damage will occur due to low temperature embrittlement. When cable will be pulled with an ambient temperature within a three day period prior to pulling of 40°F or lower, cable reels shall be stored during the three day period prior to pulling in a protected storage with an ambient temperature not lower than 55 degrees F and pulling shall be completed during the work day for which the cable is removed from the protected storage.

J. Color Coding:
1. Conductor jacket shall be color coded as follows:

AC POWER

480V/277 Volt, 3 phase	208Y/120 Volt, 3 phase	240/120 Volt, 3 phase
Phase A - Brown	Phase A - Blue	Phase A - Blue
Phase B - Orange	Phase B - Black	Phase B - Black
Phase C - Yellow	Phase C - Red	Phase C - Orange
Neutral - White	Neutral - White	Neutral - White
Ground - Green	Ground - Green	Ground - Green

2. Control (Per ICEA Method 1, K-2):

WIRE NUMBER	COLOR
1	Black
2	Red
3	Blue
4	Orange
5	Yellow
6	Brown
7	Red With Black
8	Blue With Black
9	Orange With Black
10	Yellow With Black
11	Brown With Black
12	Black With Red
13	Blue With Red
14	Orange With Red
15	Yellow With Red
16	Brown With Red
17	Black With Blue
18	Red With Blue
19	Orange With Blue

3. DC Power
   a. Positive Lead - RED
   b. Negative Lead - BLACK
4. Instrumentation Signal
   a. Pairs - Black and White
   b. Triads - Black, Red and White
5. Equipment Ground - GREEN

K. Instrumentation Cable Installation:

1. Where instrumentation cables are installed in panels, etc., arrange wiring to provide maximum clearance between cables and other conductors. Instrumentation cables shall not be installed in same bundle with conductors of other circuits.
2. Grounding of cable shield shall be accomplished at one point only, unless otherwise required by instrumentation systems manufacturer.
3. Special instrument cable shall be as specified or recommended by the vendor of the equipment or instruments requiring such wiring. Installation, storage, terminations, etc., shall be per manufacturer's recommendations.

3.02 IDENTIFICATION

A. Identify wire and cable under provisions of Section 260553.

B. Identify each conductor with its circuit number.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Inspect wire and cable for physical damage and proper connection.

C. Measure tightness of bolted connections and compare torque measurements with manufacturer's recommended values.

D. Field Testing:
1. Wires and cables shall be tested before being connected to motors, devices or terminal blocks.
2. If tests reveal defects or deficiencies, the Contractor shall make the necessary repairs or shall replace the cable as directed by the Owner's Representative, without additional cost to the Owner.
3. All tests shall be made by and at the expense of the Contractor who shall supply all testing equipment.

E. Continuity Tests: All cables, wires and shields shall be tested for continuity. Testing for continuity shall be by test light or buzzer.

F. Insulation-Resistance Tests:
1. 600V power and control cables and wires shall be tested for their insulation-resistance values. Test shall utilize a megohmmeter with applied voltage to be 1000VDC for one (1) minute. Insulation-resistance test shall be performed on each conductor with all other conductors grounded. The resistance value shall be 20 megohms or greater.
2. 300V instrumentation signal cable shall be tested from conductor to conductor, conductor to ground, and conductor to shield using a digital volt-ohm meter. The resistance value shall be 10 megohms or greater.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Grounding electrodes and conductors.

B. Equipment grounding conductors.

C. Bonding.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electric Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 COMPONENTS

A. Ground clamps: OZ ELECTRICAL MANUFACTURING COMPANY, Type "CG", or equal by STEEL CITY or APPLETON.

B. Raceways, conductors, outlet boxes, pull and junction boxes to be furnished in accordance with applicable sections of these specifications.

C. Rod Electrode: Copper, 3/4-inch diameter, 10 feet long.

D. Wire: Copper, sized to meet NFPA 70 requirements.

PART 3 - EXECUTION

3.01 INSTALLATION

A. General:
   1. Clean all conductive surfaces on equipment to be grounded, to assure good electrical continuity.
   2. Effectively bond all grounding conductors to grounding rod electrodes, equipment enclosures and ground busses.
   3. Locate all grounding attachments away from areas subject to physical damage. Provide protective covering as required.
   4. Install service entrance building ground as per NEC and Local Utility requirements.
   5. Service entrance shall be bonded to street side of first flange or coupling of incoming main water line with heavy duty ground clamp. Bonding conductor to be sized in accordance with NFPA 70.
   6. Building steel shall be bonded to ground bus on main service with a conductor the same size as in B.1 below.
   7. Install new service grounds and grounding systems for new service as per Local Utility and NEC requirements.
   8. Generators shall have a dedicated grounding system for a separately derived system for switching neutrals.

B. Feeder/Branch Circuits:
   1. All circuits shall have a separate green grounding conductor in conduit sized in accordance with NFPA 70. Minimum size of conductor shall be No. 12 AWG.
   2. Flexible conduit will not be approved as achieving continuity of ground. All flexible conduit to have a jumper wire sized to ampacity of branch breaker and to be connected to conduit system on both ends; this applies to fixtures, motors, controls, etc.

3.02 TEST

A. Test ground on main service. Ground system resistance shall be no greater than 10 ohms using test equipment similar to a "Biddle" test. Test data to be submitted to the Owner's Representative for approval and such approved test data to become a part of the Record Documents.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. System of supporting devices and hangers for support or bracing for conduit, electrical equipment, safety switches, fixtures, panelboards, outlet boxes, junction boxes and cabinets.

1.02 REFERENCES

A. ANSI/NFPA 70 - National Electrical Code.

1.03 REGULATORY REQUIREMENTS

A. Conform to requirements of ANSI/NFPA 70.

B. Furnish products listed and classified by Underwriters Laboratories, Inc.

PART 2 - PRODUCTS

2.01 EQUIPMENT REQUIREMENTS

A. Provide appropriate corrosion-resistant supporting devices and hangers for electrical equipment, as manufactured by ERICO PRODUCTS, INC., CADDY FASTENERS, STEEL CITY, MINERALLAC or equivalent.
   1. "Z" purlin clips.
   2. Conduit clips.
   3. Beam clamps (universal and vertical flange).
   4. Beam clamps (set screw type).
   5. Combination push-in conduit clips.
   6. Combination conduit hanger clamps.
   7. Flexible conduit clips.
   8. Special combination conduit clips.
   9. One hole steel straps.
   10. Conduit hangers.
   2. Reinforced thermosetting resin conduit and fittings shall conform to UL No. 1684. Both conduit and fittings shall consist of 68 percent glass content encapsulated in an epoxy matrix.

B. Provide materials, sizes and types of anchors, fasteners and supports to carry the loads of equipment, wire in conduit and conduit.

2.02 CHANNEL SUPPORT SYSTEM

A. Channel systems and supports shall be manufactured by KINDORF/THOMAS & BETTS, or approved equal.

B. Channels: 1-1/2" x 1-1/2".

C. Channels and all associated accessories and bolts shall be Type 316 Stainless Steel.

D. Channels shall have 9/16" bolt holes on 1-1/2" centers.

E. Provide end caps for all channels.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Secure conduits to within 3 feet of each outlet box, junction box, cabinet, fitting, etc., and at intervals not to exceed 10 feet in accordance with currently effective edition of the National Electric Code.

B. In seismic zones, support conduits 1 inch and smaller at 6 foot intervals.

C. Install clamps secured to structure for feeder and other conduits routed against structure. Use drop rods and hangers to support conduits run apart from the structure.

D. Provide and install suitable angle iron, channel iron or steel metal framing with accessories to support or brace electrical equipment including safety switches, fixtures, panelboards, etc.

E. Paint all supporting metal not otherwise protected, with rust inhibiting primer and then with a finish coat if appropriate to match the surrounding metal surfaces. Prepainted or galvanized support material is not required to be painted or repainted.

F. Do not use chains, perforated iron, baling wire or tie wire for supporting conduit runs. Use of clips to support conduit to top of t-bar ceiling grid will not be permitted.

G. Obtain permission from the Owner's Representative before drilling or cutting structural members.

H. Install surface mounted cabinets and panelboards with a minimum of four anchors.

I. Do not fasten supports to pipes, ducts, mechanical equipment and conduit.

J. Install products in accordance with manufacturer's instructions.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Conduit system with associated couplings, connectors and fittings. Conduits to be mechanically and electrically continuous from outlet to outlet and from outlets to cabinets, pull or junction boxes.
   1. Conduit Use - Rigid Galvanized Conduit:
      a. All interior and exterior circuits above and below ground.
      b. All circuits concealed in CMU walls.

B. Device Boxes: Provide each fixture switch, receptacle and other wiring device with a box of appropriate size and depth for its particular location use unless indicated otherwise.

C. Pull boxes, junction boxes and wire troughs

1.02 REFERENCES

A. ANSI C80.1 - Rigid Steel Conduit, Zinc Coated.

B. ANSI/NFPA 70 - National Electric Code.

C. NECA Standard of Installation.

D. ANSI/NEMA FB 1 - Fittings, Cast Metal Boxes, and Conduit Bodies for Conduit and Cable Assemblies.

F. ANSI C80.3 - Electrical Metallic Tubing, Zinc Coated.

G. ANSI/NEMA OS1 - Sheet-steel outlet boxes, device boxes, covers and box supports.

H. NEMA 250 - Enclosures for electrical equipment (1000 volts maximum).

1.03 SUBMITTALS

A. Submit product data under provisions of Section 013300.

B. Working Drawings:
   1. Prior to equipment submission, submit a list of proposed manufacturers with the products they produce proposed for the contract.
   2. Manufacturer’s catalog cuts for the conduit, boxes, fittings and supports proposed for use.
   3. Construction details of conduit racks and other conduit support systems with seismic restraint details and calculations signed by a licensed Engineer.
   4. Scaled working drawings showing proposed routing of all conduits, inclusive of conduits routed above grade on exterior support structures, embedded in structural concrete and conduits directly buried in earth. Drawings shall show locations of pull and junction boxes and all penetrations in walls and floor slabs.

1.04 REGULATORY REQUIREMENTS

A. Furnish products listed and classified by Underwriters Laboratories, Inc.

B. Conform to requirements of ANSI/NFPA 70.

1.05 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 017839.

B. Accurately record actual routing of all conduits.

1.06 FIELD SAMPLES

A. Provide under provisions of Section 014500.

B. Provide field sample of conduit two each at 2 feet in length.

C. Provide field sample of expansion/deflection fitting, two each.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products in accordance with manufacturers' recommendations.

B. Accept conduit on site. Inspect for damage.

C. Protect conduit from corrosion and entrance of debris by storing abovegrade. Provide appropriate covering.

1.08 PROJECT CONDITIONS

A. Verify all conduit routings by field measurements.

B. Verify routing and termination locations of conduit prior to rough-in.

C. Conduit routing is shown on Drawings in approximate locations unless dimensioned. Route as required to complete wiring system. Provide all required sweeps, boxes and fittings.

PART 2 - PRODUCTS

2.01 RIGID GALVANIZED CONDUIT

A. Rigid conduit and couplings shall be hot dipped, galvanized steel by Wheatland, Triangle, Republic or approved equal.

B. Associated couplings, connectors and fittings shall be as manufactured by THOMAS & BETTS CORP., O.Z. GEDNEY CO., EFCOR or approved equal. Catalog numbers used below are those of THOMAS & BETTS CORP. based on 3/4-inch size and are considered standards by which equivalents are to be judged.

C. ERICKSON couplings, Series 676 or approved equal, shall be used where neither length of conduit can be rotated.

D. Conduit connectors shall be threaded type. Set screw and compression type connections ARE NOT acceptable.

E. Sealing fitting locknuts shall be Series 142SL.

F. Steel or malleable iron insulated bullet hub, Series 370-379, complete with sealing "O" ring. DO NOT use "die cast" material.

H. Combination coupling shall be Series 531 for connecting rigid galvanized conduit to electrical metallic tubing.

2.02 DUCT SEAL

A. RectorSeal or approved equal.

B. Model #: 81881

2.03 OUTLET AND DEVICE BOXES

A. Acceptable Manufacturers: Raco, General Electric or approved equal.

B. Sheet Metal Outlet Boxes - All concealed boxes shall be NEMA OSI, galvanized steel:
1. Luminaire and Equipment Supporting Boxes: Rated for weight of equipment supported. Provide 1/2" male fixture stubs where required.

C. Exterior Boxes: NEMA 4X.

D. Cast Boxes: All exposed surface mounted boxes shall be NEMA FB1, Type FD, cast feralloy. Provide gasketed cover by box manufacturer.

2.04 PULL BOXES

A. All pull boxes used for this project shall be minimum LIPA B-3-6 or specifically approved equal for all customer installed power and control circuits.

B. Provide H-20 Cast-Iron Traffic Load Cover. Cover shall have 3” high logo “Electric”.

2.05 JUNCTION BOXES

A. Acceptable Manufacturers: RACO, GENERAL ELECTRIC or approved equal.

B. Sheet metal boxes: NEMA OS1, 316 stainless steel.

C. Covers: 316 stainless steel.

2.06 EXTERIOR WIRE TROUGH

A. Wireways shall be manufactured by SQUARE D, Class 526, rain tight.

B. Wireway shall be completely enclosed with removable covers.

C. Construction: Wireway shall be constructed of Type 316 stainless and shall have stainless steel screw clamps, and oil resistant gaskets.

D. All hardware, bolts, brackets, and supports shall be constructed of Type 316 stainless steel.

2.12 ELECTRICALLY CONDUCTIVE CORROSION-RESISTANT THREAD COMPOUND

A. KOPR-SHIELD or approved equal.

PART 3 - EXECUTION

3.01 INSTALLATION OF CONDUITS

A. Minimum size of conduits shall be 3/4-inch.

B. Minimum conduit depth shall be 24-inches below grade, measured to the top of the conduit on exterior underground installations.

C. Conduit joints shall be cut square, threaded, reamed smooth, and drawn up tight so conduit ends will butt in couplings, connectors and fittings.

D. All threaded conduits and fittings shall have KOPR-SHIELD compound applied to all threads prior to assembly.

E. Make bends or offsets with standard ells or field bends with an approved bender.

F. Run concealed conduits in direct line with long sweep bends or offsets. Run exposed conduits parallel to and at right angles to building lines. Group multiple conduit runs in banks.

G. Secure conduits to all boxes and cabinets with double locknuts and bushings so system will be electrically continuous from service to all outlets.

H. Install conduit in accordance with NECA Standard of Installation.

I. Cap ends of conduits to prevent entrance of water and other foreign material during construction.

J. Complete all conduit systems before pulling conductors.

K. Support conduits under provisions of Section 260529.

L. Provide approved expansion joints or fittings and bonding jumpers where conduits in concrete pass through building expansion joints.

M. Provide cable supports in conduits rising vertically in accordance with the National Electric Code, Article 300-19.

N. Provide No. 12 AWG copper pull wires or nylon cord in all empty conduits. Steel wire not acceptable as pull wire.

O. Install conduit to preserve fire resistance rating of partitions and other elements.

P. Ground and bond conduit under provisions of Section 260526.

Q. Where neither length of conduit can be rotated, ERICKSON couplings Series 676 shall be used.

R. In areas where enclosed and gasketed fixtures and weatherproof devices are specified, where rigid conduit enters a sheet metal enclosure, junction box and outlet box, and not terminated in a threaded hub, a steel, or malleable iron nylon insulated bullet hub, complete with recessed sealing "O" ring, shall be used, Series 370-379 . DO NOT use die cast material.

S. In concrete slabs block up conduit from forms and securely fasten in place. All conduits in slabs shall be installed below concrete slab.

T. Where conduits running overhead pass through building expansion joints, install flexible liquid tight conduit of same size with sufficient slack to allow conduits on either side of expansion joint to move a minimum of 3-inches in any direction. Provide supports as required on each side of expansion joint, all in accordance with seismic requirements of specific area.

U. Failure to route conduit through building without interfering with other equipment and construction shall not constitute a reason for an extra charge. Equipment, conduit and fixtures shall fit into available spaces in building and shall not be introduced into building at such times and manner as to cause damage to structure. Equipment requiring servicing shall be readily accessible.

V. Arrange supports to prevent misalignment during wiring installation.

W. Support conduit using coated steel or malleable iron straps, lay-in adjustable hangers, clevis hangers, and split hangers.

X. Group related conduits; support using conduit rack. Construct rack using steel channel; provide space on each for 25 percent additional conduits.

Y. Do not support conduit with wire or perforated pipe straps. Remove wire used for temporary supports.

Z. Do not attach conduit to ceiling support wires.

AA. Arrange conduit to maintain headroom and present neat appearance.

AB. Route exposed conduit parallel and perpendicular to walls.

AC. Route conduit installed above accessible ceilings parallel and perpendicular to walls.

AD. Route conduit in and under slab from point-to-point.

AE. Do not cross conduits in slab.

AF. Maintain adequate clearance between conduit and piping.

AG. Maintain 12-inch clearance between conduit and surfaces with temperatures exceeding 104°F (40°C).

AH. Bring conduit to shoulder of fittings; fasten securely.

AI. Use conduit hubs with sealing locknuts to fasten conduit in damp and wet locations.

AJ. Install no more than equivalent of three 90-degree bends on interior locations between boxes. Use conduit bodies to make sharp changes in direction, as around beams. Use factory elbows for bends in metal conduit larger than 2-inch size.

AK. Avoid moisture traps; provide junction box with drain fitting at low points in conduit system.

AL. Do not use dissimilar strap or clamp supports. Provide dielectric tape, fittings, straps, and bushings where dissimilar metals are used.

AM. Where fittings for liquid-tight flexible conduit are brought into an enclosure with a knockout, a gasket assembly, consisting of one piece "O" ring, with a Buna-R sealing material, Series 5200, shall be installed on outside of box. Fittings shall be made of either steel or malleable iron only, and shall have insulated throats or insulated bushings.

AN. A copper ground wire sized in accordance with NEC shall be installed on the inside of the conduit as a jumper around flexible conduit to assure a continuity of ground.

AO. Install a copper jumper across all flexible conduit including lighting fixtures, controls and other utilization equipment.

AP. Install liquid-tight flexible conduit in such a manner as to prevent liquids from running on surface toward fittings.

AQ. Allow sufficient slack conduit to reduce the effect of vibration.

AR. Complete all conduit systems before pulling the conductors.

AS. Support in accordance with requirements of National Electric Code.

3.02 INSTALLATION OF BOXES

A. Install boxes concealed in finished walls.

B. Locate boxes to prevent moisture from entering or accumulating within them.

C. Support boxes independently of conduit, as required by the National Electric Code.

D. Provide 4" x 1-1/2" octagonal, 4" x 1-1/2" square or 4" x 2-1/8" square ceiling outlet boxes.

E. Where required to hang a specific fixture, provide a fixture stud of the no-bolt, self-locking type on ceiling outlets.

F. Provide 2-1/2" x 3-3/4" one gang masonry boxes for switches and receptacles installed concealed in concrete block walls. For increased cubic capacity, provide 3-1/2" x 3-3/4" one gang masonry boxes. Where more than two conduits enter the box from one direction, provide 4" square boxes with square cut device covers not less than 1" deep specifically designed for this purpose. Use round edge plaster rings only if the block walls are to be plastered. Use sectional or gang-type outlet boxes only in drywall construction.

G. Provide 4-11/16" square outlet boxes with square cut device corners for block walls or round edge plaster rings for plastered walls for telephone outlets. Single gang device boxes are not acceptable.

H. Provide fittings with threaded hubs for screw connections and with the proper type covers for switches and receptacles served by exposed conduit. Use pressed steel outlet only for ceiling fixture outlets.

I. Provide condulets with threaded hubs and covers and with proper configurations for all changes of direction of exposed conduits. Standard conduit ells may be used if they do not interfere or damage or mar the appearance of the installation.

J. Use boxes of sufficient cubic capacity to accommodate the number of conductors to be installed, in accordance with the National Electric Code.

K. Effectively close unused openings in boxes with metal plugs or plates.

L. Set boxes so that front edges are flush with finished surfaces.

M. Support boxes from structural members with approved braces.

N. Install blank device plates on outlet boxes left for future use.

O. Provide bushings in holes through which cords or conductors pass.

P. Install boxes so that the covers will be accessible at all times.

Q. Electrical boxes may be installed in vertical fire resistive assemblies classified as fire/smoke and smoke partitions without affecting the fire classification, provided such openings occur on one side only in each framing space and that openings do not exceed 16 square inches. All clearance between such boxes and the gypsum board shall be completely filled with joint compound or approved fire-resistive compound. The wall shall be built around outlet boxes larger than 16 square inches so as not to interfere with the wall rating.

3.03 INSTALLATION OF PULL BOXES, JUNCTION BOXES AND WIRE TROUGHS

A. Provide junction boxes as shown on Drawings and otherwise where required, sized according to number of conductors in box or type of service to be provided. Minimum junction box size 4-inch square and 2-1/8-inches deep. Provide screw covers for junction boxes.

B. Install boxes in conduit runs wherever necessary to avoid long runs or too many bends. Do not exceed 100-foot runs without pull boxes. Install pull boxes at all 90-degree bends.

C. Rigidly secure boxes to walls or ceilings. Conduit runs will not be considered adequate support.

D. Install boxes with covers in accessible locations. Size boxes in accordance with the National Electric Code.

E. Do not install pull boxes or junction boxes for joint use of line voltage and signal or low voltage controls unless all conductors are insulated for the highest voltage being used in the same box.

F. Coordinate installation of exterior pull boxes with General contractor to establish elevations of finished grades and pavements. All castings shall have chimney adjustment of + 6”.

3.04 CONDUIT LOCATIONS

A. Route all conduit concealed in walls or above finished ceilings. Provide boxes and conduits concealed in walls for all power and controls. Conduit will not be permitted within new floor slab at treatment building.

B. Surface mounted conduits will only be allowed in pipe trenches and existing block walls. Surface mounted conduits shall only be permitted for vertical runs. All horizontal runs shall be installed above finished ceilings.

D. All conduit shall be primed and painted to match existing adjacent wall color.

G. Do not route conduits over pump motors, roof hatches and trolly beams which would prevent removal of pump motors.

END OF SECTION

+ + NO TEXT ON THIS PAGE + +

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Requirements for providing underground ducts. Underground ducts shall be provided in accordance with the requirements specified under this section, the Specifications and the Contract Drawings.

B. Underground ducts shall be concrete encased. Provide reinforced concrete encasement for the duct system.

C. Perform all excavations and backfilling, as required, unless specifically shown otherwise on the Contract Drawings or stated in the Specifications.

1.02 PAYMENT

A. Payment for all work for underground ducts shown on the Contract Drawings and specified herein shall be included in the lump sum price bid for Contract Item 1. Payment for additional conduit, required by changes from that shown on the Contract Drawings or specified, will be made at the unit prices bid for additional conduit as described in the General Conditions and as specified under Division 1 of the Specifications.

1.03 REFERENCES

A. Underground ducts shall comply with the latest applicable provisions and recommendations of the following:
   1. NFPA 70, National Electrical Code.
   2. National Electrical Safety Code.
   3. UL No. 651, Schedule 40 and 80 PVC conduit.
   4. NEMA TC2, Electrical Plastic Tubing, Conduit and Fittings.
   5. UL No. 1684, Reinforced Thermosetting Resin conduit.

1.04 SUBMITTALS

A. Submit working drawings, shop drawings and material specifications for the approval of the Engineer in accordance with the requirements of the General Conditions, Article GC-14 – Contractor Submissions; and as specified under Division 01 of the Specifications.

B. Working Drawings:
   1. Prior to equipment submission, submit a list of proposed manufacturers with the products they produce proposed for the contract.
   2. Manufacturer’s Literature with manufacturer’s name, designation and catalog number for all products proposed for the underground duct system.
   3. Scaled Working Drawings showing the routing of the duct banks and the location of manholes, handholes and the principal outline of buildings and structures. Reference duct banks dimensionally from fixed objects or structures. Include profiles of duct banks showing crossings with piping and other underground systems.

1.05 DELIVERY, STORAGE AND HANDLING

A. Underground ducts shall be delivered, stored and handled in accordance with the Specifications and the manufacturer’s instructions.

PART 2 - PRODUCTS

2.01 RIGID NON-METALLIC CONDUIT AND FITTINGS

A. Non-metallic conduit for ducts shall be PVC plastic or fiberglass-reinforced epoxy for all 600V systems, instrumentation systems, and communication systems.
   1. PVC plastic conduit shall be Schedule 40, NEMA type EPC-40-PVC, rated 90 degrees C, conforming to UL No. 651.
   2. Reinforced thermosetting resin conduit and fittings shall conform to UL No. 1684. Both conduit and fittings shall consist of 68 percent glass content encapsulated in an epoxy matrix.

B. All non-metallic fittings, elbows, bodies, terminations, expansions, and fasteners shall be the same material and manufacturer as the conduit.

C. PVC conduit shall be by Carlon, Amoco or approved equal. Fiberglass-reinforced epoxy conduit shall be by FRE conduit, A.O. Smith or approved equal.

2.02 CONDUIT SPACERS

A. Conduit spacers shall be nonmetallic, interlocking type to maintain spacing between conduits. Spacers shall be suitable for all types of conduit in multiple sizes.

2.03 WARNING RIBBON

A. Warning ribbon shall be a three-inch-wide, four mil polyethylene or polyvinyl chloride tape. The tape shall be permanently imprinted in red color, “CAUTION BURIED ELECTRIC LINE BELOW.”

B. Warning tape shall be by Seton, Ideal Industries or approved equal.

2.04 REINFORCED CONCRETE

A. Concrete for envelope shall be 4,000 psi concrete in accordance with the requirements of Section 033000 - Cast-in-Place Concrete. Steel reinforcement shall be in accordance with the requirements of Section 033000 - Cast-in-Place Concrete.

B. Provide red UV stable concrete dye in mix for integral pigment in concrete encasement of underground ducts in accordance with ASTM C979.

2.05 CONDUIT ACCESSORIES

A. Duct seal for conduits shall be in accordance with the requirements of Section 260533 – Raceways and Boxes for Electrical Systems.

2.06 EXPANSION AND DEFLECTION FITTINGS

A. Where specifically shown on the Contract Drawings, expansion and deflection fittings shall be provided at the structural joints of the underground duct system.

B. Expansion and deflection fittings shall be in accordance with Section 260533 – Raceways and Boxes for Electrical Systems.

2.07 CONDUIT BUSHINGS

A. Conduit bushings shall be provided for the termination of rigid steel conduits at each manhole.

B. Conduit bushings shall be in accordance with Section 260533 – Raceways and Boxes for Electrical Systems.

PART 3 - EXECUTION

3.01 INSTALLATION

A. The duct system shall be installed to avoid interferences with structures, piping, and other underground systems. Terminate ducts with insulated grounding bushings at manholes and handholes. Conduit ducts shall be sized, arranged, and installed in a reinforced concrete envelope as shown on the Contract Drawings.

B. Trenches for duct banks shall be in accordance with the requirements of Section 312333 - Trenching. Duct bank trenches shall have the bottom tamped firm and even, and suitably braced side forms shall be employed in forming the envelope.

C. Duct banks shall follow straight lines as far as possible. Where deviation from a straight line becomes necessary, offsets shall be made using 5 degree angle coupling or make bend with sweeps. The sweep radius shall be 36-inch for 90 and 45 degree bends and 30-inch for 30 degree bends. Where directed by the Engineer, bends shall be made up with standard factory bends or other approved curved sections.

D. Duct bank installations and penetrations through foundation walls shall be made watertight.

E. Duct banks shall be assembled using non-magnetic saddles, spacers, and separators. Separators shall be positioned to provide 3-inch minimum concrete separation between the outer surfaces of the ducts.

F. Concrete covering shall be provided on both sides, top and bottom of the concrete envelopes around conduits. Concrete covering shall be in accordance with the detail shown on the Contract Drawings. Top of concrete encasement shall not be less than thirty inches below finish grade. Add red dye to concrete used for envelopes for easy identification during subsequent excavation.

G. Before pouring concrete, written approval shall be obtained from the inspecting engineer.

H. Ducts shall be firmly fixed in place during pouring of concrete. Concrete shall be carefully spaded and vibrated to insure filling of all spaces between ducts.

I. A transition shall be made from non-metallic to rigid steel conduit where duct banks enter structures or turn upward for continuation above grade. Rigid steel ducts shall be terminated using insulated grounding bushings. Ducts inside buildings shall be continued using rigid steel or PVC coated rigid steel conduits as required for the area.

J. Ducts entering manholes and hand holes shall be terminated using suitable end bells. Rigid steel ducts shall be terminated using insulated grounding bushings.

K. Backfilling for duct banks shall be in accordance with the requirements of Section 312333 - Trenching. Backfilling shall be permitted when directed by the Engineer to proceed. Backfilling shall not be with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material or other materials which can damage or contribute to corrosion of ducts or cables or prevent adequate compaction of fill.

L. Duct runs shall be sloped for drainage toward manholes and away from buildings with a slope of approximately 3 inches per 100 feet.

M. A ground cable shall be installed in each duct bank envelope. Cable shall be in accordance with the requirements of Section 260526 – Grounding and Bonding for Electrical Systems. The ground shall be made electrically continuous throughout the entire duct bank system. Ground cable shall be connected to the building, station ground grid, equipment ground buses and to each conduit grounding bushing of the underground duct system. The ground cable shall be terminated at the last manhole or handhole for outlying structures.

N. After installation, each conduit in each duct bank shall be cleaned and cleared of obstructions and foreign matter by rodding and by the passage of cleaning brushes or cutting mandrels. After cleaning, the clearance of each conduit shall be checked by passing a 12-inch long mandrel, of diameter 1/2 inch less than the nominal duct diameter, through the entire length of duct run. Ducts which do not permit passage of the mandrel shall be cleared, cut out and replaced or sealed and replaced by additional construction. The duct bank conduit cleaning shall be included in the electric conduit system field test report specified in Section 260533 – Raceways and Boxes for Electrical Systems.

O. A warning ribbon shall be installed approximately 12 inches below finished grade over all underground duct banks carrying cables of 480 volts and higher.

P. All ducts entering buildings and structures shall be sealed. All empty spare ducts shall be sealed and plugged.

Q. An expansion and deflection fitting shall be installed on each conduit at each of the structural expansion joints when shown on the Contract Drawings. Joints shall be located as defined by the criteria noted on the Contract Drawings.

END OF SECTION

NO TEXT ON THIS PAGE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Removal and storage of subsoil.

B. Cutting, grading, filling and rough contouring the site prior to placement of topsoil or pavement base for final grading.

1.02 RELATED SECTIONS

A. Section 311100 - Site Clearing.

B. Section 312316 - Excavation - Removal of Unsuitable Soils.

C. Section 312323 - Backfilling - Replacement of Unsuitable Soils.

1.03 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18 inch Drop.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Sieve Analysis: Submit a sieve analysis of all types of fill material to be used.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of utilities remaining, by horizontal dimensions, elevations or inverts, and slope gradients.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Subsoil: Reused excavated material, graded, free of lumps, rocks and gravel larger than 3 inches in size, debris and contaminants.

PART 3 -

EXECUTION

3.01 EXAMINATION

A. Verify site conditions.

B. Verify that survey benchmark and intended elevations for the work are as indicated.

3.02 PREPARATION

A. Identify required lines, levels, contours and datum.

B. Identify known underground, aboveground and aerial utilities. Stake and flag locations.

C. Coordinate the removal or relocation of utilities with the necessary utility companies.

D. Protect above and below-grade utilities that are to remain.

E. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

F. Protect benchmarks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

3.03 APPLICATION

A. Excavate subsoil from areas to be further excavated or regraded. Do not excavate wet subsoil.

B. Stockpile in area designated on site. Remove excess subsoil not being reused from site.

C. Stockpile subsoil to a height not exceeding 8 feet. Cover to protect from erosion.

D. When excavation through roots is necessary, perform work by hand and cut roots with sharp axe.

E. Fill areas to contours and elevations with unfrozen subsoil material with allowances made for topsoil, aggregate base course or paving.

F. Place and compact subsoil fill material in 12 inch lifts (compacted thickness). Compact to 92 percent maximum dry density in accordance with ANSI/ASTM D1557.

G. Maintain optimum moisture content of fill materials to attain required compaction density.

H. Make grade changes gradual. Blend slope into level areas.

I. Remove surplus fill materials from site.

3.04 TOLERANCES

A. Maximum Variation From Top Surface of Subgrade: 1 inch.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Perform tests and analysis of fill material in accordance with ANSI/ASTM D1557.

C. Perform compaction tests at a rate of one for every 10 cubic yards of material placed.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavation for building foundations.

B. Excavation for slabs-on-grade, paving and landscaping.

C. Excavation for site structures.

D. Site excavation.

1.02 RELATED SECTIONS

A. Section 312213 - Rough Grading.

B. Section 312323 - Backfill: Backfilling excavated material.

1.03 QUALITY ASSURANCE

A. Do not excavate wet or frozen materials without written approval from the Owner's Representative.

B. Provide safety barricades around open excavations.

1.04 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as indicated.

1.05 COORDINATION

A. Coordinate work under provisions of Section 013100.

PART 2 - PRODUCTS

NOT USED.

PART 3 - EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours and datum.

B. Identify known underground, above ground and aerial utilities. Stake and flag locations.

C. Notify utility company to remove or relocate utilities, if required.

D. Protect above and below grade utilities which are to remain.

E. Protect plant life, lawns and other features remaining as a portion of final landscaping.

F. Protect bench marks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic.

G. Notify the Owner's Representative prior to commencement of excavation.

3.02 EXCAVATION

A. Underpin adjacent structures that may be damaged by excavation work, including utilities and pipe chases.

B. Excavate subsoil required to accommodate landscaping and construction operations to the limits as indicated on the plans.

C. Machine slope banks to angle of repose or less, until shored.

D. Grade top perimeter of excavation to prevent surface water from draining into excavation.

E. Hand trim excavation. Remove loose matter.

F. Remove lumped subsoil, boulders, and rock.

G. Notify the Owner's Representative of unexpected subsurface conditions and discontinue affected work in area until notified to resume work.

H. Correct unauthorized excavation at no extra cost to Owner in accordance with Section 312323.

I. Stockpile excavated material in area designated on site and remove excess material not being reused from site.

3.03 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Provide for visual inspection of bearing surfaces.

3.04 PROTECTION

A. Protect work under provisions of Section 015000.

B. Protect excavations by methods required to prevent cave-in or loose soil from falling into excavation.

C. Protect bottom of excavations and soil adjacent to and beneath foundation from freezing.

END OF SECTION

PART -1 GENERAL

1.01 SECTION INCLUDES

A. Site structure backfilling to sub-grade elevations.

B. Site filling and backfilling.

C. Consolidation and compaction.

D. Fill for over-excavation.

E. Environmental testing.

1.02 RELATED SECTIONS

A. Section 312316 - Excavation.

B. Section 312213 - Rough Grading.

1.03 REFERENCES

A. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb. Rammer and 18-inch Drop.

B. ASTM D2487 - Standard Practice for Classification of Soils for Engineering Purposes.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Material Source: Submit name of imported material suppliers.

C. Provide a letter certifying that each type of imported fill material has been provided by a NYSDEC certified clean fill source or has been tested in accordance with NYSDEC Unrestricted Soil Use Guidelines as defined in Subpart 375-6 Remedial Program Soil Cleanup Objectives.

D. Test Reports: Submit sieve analysis and test results from NYSDEC Unrestricted Soil Use Guidelines for each type of imported fill to be used.

1.05 PROJECT CLOSEOUT SUBMITTALS

A. Submit under provisions of Section 017800.

B. Provide documentation on the contractor’s letterhead certifying that all fill material utilized for this project came from approved sources and met the requirements of the NYSDEC Unrestricted Program Soil Use Guidelines.

PART 2 - PRODUCTS

2.01 IMPORTED FILL SOURCE

A. All imported fill materials shall be provided by a NYSDEC certified clean fill source or meet the requirements of NYSDEC Unrestricted Soil Use Guidelines as defined in Subpart 375-6: Remedial Program Soil Cleanup Objectives.

B. Test samples of imported fill in accordance with the following table:

Recommended Number of Soil Samples for Imported Soil			
Contaminant	VOC's	SVOC's, Inorganics & PCB's/Pesticides	
Soil Quantity (cubic yards)	Discrete Samples	Composite	Discreet Samples/Composite
0-50	1	1	3-5 discrete samples from different locations in the fill being provided will comprise a composite sample for analysis
50-100	2	1	
100-200	3	1	
200-300	4	1	
300-400	4	2	
400-500	5	2	
500-800	6	2	
800-1000	7	2	
>1000	Add an additional 2 VOC and 1 composite for each additional 1000 cubic yards or consult with DER		

C. Provide materials from the same source throughout the work. Change of source requires approval from the Owner's Representative.

2.02 FILL MATERIALS

A. Coarse Aggregate: Angular crushed or natural stone; washed, free of shale, clay, friable material, sand and debris; graded in accordance with ASTM D2487 Group Symbol GW or GP within the following limits

Sieve Size	Percent Passing
1-1/2-inch	100%
1-inch	90 - 100%
1/2-inch	0 - 15%
No. 200	0 - 1%

B. Pea Gravel: Natural stone; washed, free of clay, shale, organic matter; graded in accordance with ASTM D2487 Group Symbol GC or GM, within the following limits:
1. Minimum Size: ¼ inch.
2. Maximum Size: 5/8 inch.

C. Sand: Natural river or bank sand; washed, free of silt, clay, loam, friable or soluble materials, or organic matter; graded in accordance with ASTM D2487 Group Symbol SW or SP, within the following limits:

1.

Sieve Size	Percent Passing
No. 4	100
No. 14	10 - 100
No. 50	5 - 90
No. 100	4 - 30
No. 200	0

D. Subsoil: Reused, excavated material, graded, free of lumps, rocks and gravel larger than 3 inches in size, debris and contaminants; no more than 15% passing the No. 200 sieve; no more than 30% retained on the ¾" sieve.

E. Drywell Collar Material: Clean sand and gravel containing less than 15% fine sand, silt and clay. Silt and clay fractions are not to exceed 5%. Native material may be reused if it meets this requirement.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate.

B. Verify fill materials to be reused are acceptable.

C. Verify items to be buried during backfilling process have been inspected prior to backfilling.

3.02 PREPARATION

A. Compact subgrade to 92 percent maximum dry density in accordance with ANSI/ASTM D1557.

B. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with sand or subsoil and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 BACKFILLING

A. Backfill areas to contours and elevations with unfrozen materials.

B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy materials.

C. Place and compact fill material in 12 inch lifts (compacted thickness). Compact to 92 percent maximum dry density in accordance with ANSI/ASTM D1557.

D. Employ a placement method that does not disturb or damage structures or other items against which material is backfilled.

E. Backfill against supported structures. Do not backfill against unsupported structures.

F. Backfill simultaneously on each side of structure.

G. Make grade changes gradual. Blend slope into level areas.

H. Remove surplus backfill materials from site.

I. Leave fill material stockpile areas completely free of excess fill materials.

3.04 TOLERANCES

A. Maximum Variation From Top Surface of Backfilling Under Paved Areas: 1/4 inch.

B. Maximum Variation From Top Surface of General Backfilling: 1 inch.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Perform field tests and analysis of fill material in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

D. Unless additional testing is required by the Owner's Representative, compaction tests shall be taken at the following rates:
   1. Pavement Subgrade: One test per 5,000 square feet of subgrade immediately prior to placing subbase.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Excavate trenches for piping and utilities.

B. Compacted bedding and backfill around and over piping and utilities to subgrade elevations.

C. Backfilling and compaction.

1.02 RELATED SECTIONS

A. Section 312213 - Rough Grading: Topsoil removal from site surface.

1.03 REFERENCES

A. ANSI/ASTM C136 - Method for Sieve Analysis of Fine and Coarse Aggregates.

B. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10 lb Rammer and 18-inch Drop.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Test Reports: Submit a sieve analysis for backfill to be used.

1.05 QUALITY ASSURANCE

A. Do not excavate wet or frozen materials without written approval from the Owner's Representative.

B. Do not backfill over or with wet or frozen materials.

C. Provide safety barricades around open excavations.

1.06 FIELD MEASUREMENTS

A. Verify that survey benchmark and intended elevations for the work are as shown on plans.

1.07 COORDINATION

A. Coordinate work under provisions of Section 013100.

B. Coordinate trenching with installation of pipe or conduit.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Subsoil: Reused, excavated material, graded, free of lumps, rocks and gravel larger than 3 inches in size, debris and contaminants.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing site conditions and substrate.

B. Verify fill materials to be reused are acceptable.

C. Verify items to be buried during backfilling process have been inspected prior to backfilling.

3.02 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Maintain and protect existing utilities remaining which pass through work area.

C. Protect plant life, lawns, rock outcropping and other features remaining as a portion of final landscaping.

D. Protect benchmarks, existing structures, fences, sidewalks, paving and curbs from excavation equipment and vehicular traffic. Any item damaged by the contractor shall be promptly repaired at the contractor's expense.

E. Protect above and below grade utilities which are to remain.

F. Cut out soft areas of subgrade not capable of in situ compaction. Backfill with subsoil fill and compact to density equal to or greater than requirements for subsequent backfill material.

3.03 EXCAVATION

A. Excavate subsoil required for piping.

B. Cut trenches to the dimensions shown on the plans.

C. Excavation shall not interfere with normal 45 degree bearing splay of foundations.

D. Hand trim excavation. Hand trim for bell and spigot pipe joints. Remove loose matter.

E. Remove lumped subsoil, boulders, and rock.

F. For trenches made in solid rock, excavate to a depth of 1 foot below the proposed pipe invert.

G. Correct unauthorized excavation at no cost to Owner in accordance with Section 312323.

H. Stockpile excavated material in area designated on site and remove excess material not being used from site. Remove excavated material from site.

3.04 BACKFILLING

A. Support pipe and conduit during placement and compaction of fill material.

B. For trenches made in solid rock, place an additional 1 foot of fill material under pipe or conduit.

C. Place fill material to the dimensions and limits as shown on the plans.

D. Place and compact fill material in 12 inch lifts (compacted thickness) for depths greater than 2 feet and 6 inch lifts (compacted thickness) for depths less than 2 feet. Compact to 92 percent maximum dry density in accordance with ANSI/ASTM D1557.

E. Place fill material simultaneously on both sides of the pipe or conduit. Backfill to the dimensions and limits shown on the plans with reused subsoil.

F. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen or spongy subgrade surfaces.

G. Place and compact material in continuous layers not exceeding 6 inches compacted depth.

H. Employ a placement method that does not disturb or damage conduit or pipe.

3.05 TOLERANCES

A. Maximum Variation From Top Surface of Backfilling Under Paved Areas: 1/4 inch.

B. Maximum Variation From Top Surface of General Backfilling: 1 inch.

3.06 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 014500.

B. Perform field tests and analysis of fill material in accordance with ANSI/ASTM D1557.

C. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

D. Unless additional testing is required by the Owner's Representative, compaction tests shall be taken at the springline of the pipe and after each lift at 100 foot intervals along the pipe run.

3.07 CLEANING

A. Remove surplus backfill materials from site.

B. Leave fill material stockpile areas completely free of excess fill materials.

3.08 PROTECTION

A. Protect finished work under provisions of Section 015000.

B. Recompact fills subjected to vehicular traffic.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Wood and steel sheeting.

B. Sheeting box.

C. Steel H-section soldier piles.

D. Lagging.

1.02 RELATED SECTIONS

A. Section 312316 - Excavation.

B. Section 312323 - Backfilling.

C. Section 312333 - Trenching.

1.03 REFERENCES

A. Occupational Safety and Health Standards - Excavations; Final Rule (29 CFR Part 1926) - OSHA Standards.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Shop Drawings: Submit drawings and details of sheeting for information purposes only. These drawings will not be reviewed. Include design and supporting calculations prepared by a professional engineer licensed in the state of New York.

1.05 QUALITY ASSURANCE

A. Perform all work of this section in accordance with OSHA Standards and approved shop drawings.

B. Sheeting shall be installed by persons regularly engaged in sheeting installation and who have a minimum of five years of experience with the type of system being installed.

C. Sheeting shall be installed under the direct supervision of the professional engineer who designed the sheeting system. This does not require the professional engineer to be present during all phases of its installation, but it does require him to inspect the work as it progresses on a part-time basis, sufficient to adequately certify the system. The engineer shall certify, in writing, that the sheeting was installed in accordance with the supporting calculations and that the installer complied with recognized procedures, methods and techniques.

D. An amount equal to 15% of the scheduled value of the excavation support and protection will be withheld until the certification has been provided for record purposes only.

1.06 COORDINATION

A. Coordinate work under provisions of Section 013100.

B. Coordinate work with all other sections requiring temporary sheeting and bracing.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Wood Sheeting: Hardwood species of size and dimensions capable of being driven to the required depths and capable of supporting excavation sides and soil pressures when braced; free from wormholes, wind shakes, loose knots, decayed or unsound portions or defects which would impair its strength or tightness; 3 inches thick minimum.

B. Steel Sheeting: ASTM A328, corrugated "Z" shape cross-section; of size and dimensions capable of being driven to the required depths and capable of supporting excavation sides and soil pressures when braced; structurally sound; special shapes for corner construction and transition points.

C. Sheeting Boxes: Steel, of size and dimensions capable of supporting excavation sides and soil pressures; structurally sound.

D. Structural Steel: ASTM A36.

E. Tiebacks: ASTM A722, ASTM A416

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing soil substrate site conditions and elevations are as indicated on the plans.

B. Verify proposed locations of excavations are as indicated on the plans.

C. Monitor excavation support and protection systems daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage or other evidence of movement to ensure that systems are stable.

D. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

3.02 PREPARATION

A. Excavate to a depth no greater than 4 feet from existing grade.

B. Assemble and drive the sheeting in accordance with shop drawings prepared by the contractor’s engineer.

3.03 INSTALLATION - SHEETING

A. Drive sheeting in place to thoroughly support both sides of the excavation using a sheeting hammer. Use a steam or pneumatic hammer for steel sheeting.

B. Water jetting of sheeting will not be permitted. Do not loosen adjacent ground which might result in collapse.

C. Install walls and braces or shores tight and in accordance with shop drawings prepared by the contractor’s engineer.

3.04 INSTALLATION - SHEETING BOX

A. Place box in trench utilizing a means which will not damage structural integrity of the box.

B. Excavate ahead of the sheeting box only enough to advance the sheeting box and only immediately prior to moving the sheeting box.

C. Backfill on both sides of the sheeting box as it is moved.

3.05 REMOVAL OF SHEETING

A. Remove sheeting only as backfilling progresses.

B. Carefully remove sheeting such that compacted backfill is not displaced. Add additional backfill to the areas vacated by the sheeting.

C. All sheeting is to be removed from the site once its use is no longer required.

D. Removing sheeting in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities and utilities.

E. The contractor may request permission to leave sheeting or bracing in place. The Owner's Representative may grant permission on the condition that the cost of sheeting and bracing be borne by the contractor.

F. Sheeting to be left in place shall be at cut and removed to a minimum depth of 5 feet below finished grade elevation or 1 foot below lowest crossing utility/pipeline, whichever is deeper.

END OF SECTION

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Micro-pile Foundation System: Micro-piles and pile caps which transfer the loads of the structural elements indicated on the Drawings to the underlying soils/ledgerock.

1.02 RELATED SECTIONS

A. Record Drawings: Section 017839.

B. Cast-In-Place Concrete: Section 033000.

C. Excavation: Section 312316.

D. Ground-Level Glass Coated to Bolted Steel Water Storage Tank - Section 331625

1.03 DESIGN REQUIREMENTS

A. The micro-pile foundation system shall be designed in conformance with the requirements specified and shown on the Drawings.

B. Design Criteria: Transfer the dead loads and live loads indicated on the Drawings through the micro-pile foundation system to the underlying soils/ledgerock at the elevations indicated on the Drawings.

1.04 SUBMITTALS

A. Shop Drawings
   1. Submit within 21 days after approval of firm to perform the Work of this Section.
   2. Show size, spacing and location of piles, and details of the pile caps.

B. Quality Control Submittals:
   1. Qualifications Data. Submit within 14 days after approval of the Contract by the Comptroller: Name and address of the firm proposed to perform the Work of this Section. Include such qualifying information as necessary to verify that the firm meets the requirements specified under Quality Assurance Article.
   2. Design and Construction Information (Submit with Shop Drawings): Include design calculations for each pile capacity and specifications of materials intended for use (unless specified in the Sections listed under “Related Work Specified Elsewhere”).
   3. Installation Sequence (Submit with Shop Drawings): Include details of the installation sequence and equipment to be used for the micropile construction. The grouting shall be performed in accordance with the PTI (Post Tensioning Institute) “Recommended Practice for Grouting of Post Tensioned Prestressed Concrete” as applicable. Installation equipment shall be capable of drilling the micropile hole of the required minimum diameter to the required depth and maintaining the micropile hole open and clear until designated steel reinforcing has been inserted and the required minimum volume of grout has been placed. This submittal will not relieve the Contractor of responsibility for the successful performance of the micropile foundation system.

C. Contract Closeout Submittals:
   1. Micro-Pile Record Drawings: See Section 017839.

1.05 QUALITY ASSURANCE

A. Designer's and Installer's Qualifications: The firm that performs the Work of this Section shall have a minimum of 5-years-experience in the type of design and construction required for the Work of this Section and shall have designed and installed foundation systems for at least 5 projects of equivalent or greater difficulty as required by this Contract.
   1. The firm's staff shall include at least one New York State licensed Professional Engineer.
   2. The firm's supervising engineer and site foreman or superintendent for this project shall have at least 5 years of experience in this type of foundation Work.

B. Acceptable firms specializing in this type of Work include, but will not be limited to, the following:
   1. Catoh Inc., 16 Drumlia Dr., PO Box 560, Weedsport, NY 13166, (315) 834-6603.
   2. Nicholson Anchorage Company, PO Box 308, Bridgeville, PA 15017, (412) 221-4500.
   3. Construction Drilling Inc., 140 Pleasant St., North Adams, MA 01247, (413) 663-3020.
   4. I.C.O.S., 151 Grand Ave., PO Box 749, Englewood, NJ 07631, (201) 568-4411.
   5. GKN Hayward Baker Inc., 1875 Mayfield Rd., Odenton, MD 21113, (410) 551-8200.
   6. Keller – NA, 100 Stickle Avenue, Rockaway, NJ 07866, (973) 627-2100.

C. Grout cubes and grout flow test shall be approved by testing lab retained by the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Furnish micropile materials required for the Work of this Section.

B. Steel Reinforcement: Section 033000.

PART 3 EXECUTION

3.01 INSTALLATION

A. Micropiles may be drilled by rotary or rotary percussive drilling equipment. Coring bits, roller bits, drag bids and/or down the hole hammers (DTH) may be utilized to advance the micropile hole through overburden soils, fill, or obstructions, etc. the required depth. Continuously place flush joint threaded drill casing to the required depth to prevent the collapse of the micropile hole.

B. Drill cuttings shall be eliminated by wash-water or other means which will not appreciably alter soil stability or aggravate existing environmental conditions. All debris from the drilling operations shall be removed by the Contractor.

C. Prior to installing the approved reinforcing and grout placement, the micropile hole shall be flushed with clean water to remove all contaminated water and cuttings.

D. The approved reinforcing steel shall be inserted for the depth of the micropile hole not more than 48 hours prior to grouting. Provide Schedule 40 PVC centralizers at a maximum of 10 feet on center, beginning 5-feet off the pile bottom. Uppermost centralizer shall be located no more than 5 feet from the top.

F. Grout placement into the micropile hole shall be accomplished by tremie method. A tremie pipe of suitable diameter shall be inserted to the bottom of the micropile hole. Water shall be pumped at a high velocity through the tremie pipe until the wash water at the top of the casing is clear. The micropile hole shall be grouted immediately thereafter.

G. The approved grout mix shall be pumped through the tremie pipe to the bottom of the micropile hole. Pumping shall continue until all water is displaced and the basing is full to the top of the

micropile hole with a homogeneous grout mix. The tremie pipe shall be gradually lifted as the cement is being pumped to facilitate the upward flow of the grout. The end of the tremie pipe shall always be embedded at least five feet into the rising grout within the cased hole. Once the casing is overflowing with grout the tremie pipe shall be fully removed.

H. The flush joint casings shall be gradually extracted from the micropile hole. A positive flow of grout into the micropile hole shall be maintained always when the casing is being withdrawn. Blockage inside the casing shall be prevented in order to maintain a positive flow of grout into the micropile hole. The flow of grout shall be equal to or greater than the column represented by the outside diameter of the casing multiplied by the length of the casing withdrawn.

I. The concrete grout in the casing shall be pressurized either continuously or periodically as the casing is extracted. The micropile contractor elects to use periodic pressurization, no more than five feet of casing shall be withdrawn between applications of pressure.

J. Application of pressure to the micropile grout may be accomplished by either pneumatic or specific injection. The amount of pressure applied shall be such that the resulting micropile diameter meets the design requirements and pile bond values are enhanced without causing detrimental side effects.

K. As the grout column drops in the casing during withdrawal and pressurization, additional grout shall be added to raise the grout level to the top of the casing.

L. The grouting of the pile shall continue uninterrupted and shall be completed within a time frame not to exceed the initial setting time of the mixture.

M. Tolerances:
   1. Variation from Vertical: 2 degrees maximum.
   2. Center of Top of Pile: Within 2 inches of design position.

3.02 FIELD QUALITY CONTROL

A. Do not install piles within 10 feet of grouted piles until one overnight period has elapsed (minimum 12 hours).

B. Load Testing Piles: Test piles in accordance with ASTM D 1143, Quick Load Test Method for Individual Piles with the following modifications:
   1. Do not start a load test until the earth is removed to the elevation of the bottom of the pile cap.
   2. Notify the Owner's Representative 5 working days prior to start of a load test.
   3. Perform a load test on one pile in each pile cap group indicated on the Drawings to be load tested.
   4. Apply load in 10-15 percent increments at 2.5-minute intervals to 200 percent of the allowable design load.
   5. Hold full test load for a period of one hour.
   6. Remove full test load in four 25 percent decrements at 5.0-minute intervals.
   7. The net settlement after rebound shall not exceed 0.50 inch.
   8. Test piles, if properly located and not exceeding 0.50-inch net settlement, are acceptable as permanent and may be left in place.
   9. Submit one copy of load test results, stamped by a New York State licensed professional engineer, to the Owner's Representative.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Finish grade subsoil.

B. Place, level and compact topsoil.

1.02 RELATED SECTIONS

A. A. Section 329219 - Seeding.

1.03 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 016500.

B. Deliver topsoil to the site in uncontaminated containers.

C. Do not stockpile topsoil over a height of 8 feet.

D. Cover stockpiled topsoil to protect from precipitation, erosion and contamination.

1.04 ENVIRONMENTAL REQUIREMENTS

A. Do not place wet or frozen topsoil.

B. Do not place topsoil on wet or frozen ground or when precipitation is occurring.

1.05 COORDINATION

A. Coordinate work under provisions of Section 013100.

B. Coordinate with all adjacent work and work within areas to receive topsoil.

C. Coordinate the storage of topsoil under provisions of Section 311100 with the placement of topsoil in this section.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Topsoil: Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; friable loam; free of subsoil, clay or impurities, plants, weeds, roots, grass, stone and foreign matter; acidity range (pH) of 5.8 to 6.5; containing a minimum of 2.75 percent and a maximum of 25 percent organic matter. Topsoil may be reused from on-site if it meets these requirements.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing substrate and conditions.

B. Verify site conditions and note irregularities affecting work of this section.

C. Beginning work of this section means acceptance of existing conditions.

3.02 PREPARATION

A. Prepare subsoil in accordance with Section 312213.

B. Eliminate uneven areas and low spots. Remove and dispose of debris, roots, branches and stones in excess of 1/2 inch in size. Remove and dispose of subsoil contaminated with petroleum products.

C. Scarify subsoil to depth of 3 inches where topsoil is scheduled to be placed. Scarify in areas where equipment used for hauling and spreading topsoil has compacted subsoil.

3.03 INSTALLATION

A. Place topsoil in areas where seeding, sodding or planting is scheduled or where shown on the plans.

B. Place topsoil to the depths as indicated on the plans.

C. Use topsoil in relatively dry state. Place during dry weather.

D. Fine grade topsoil eliminating rough or low areas. Maintain levels, profiles and contours of subgrade.

E. Remove and dispose stone, roots, grass, weeds, debris and foreign material while spreading.

F. Manually spread topsoil around trees, plants and building to prevent damage.

G. Lightly roll placed topsoil.

H. Remove surplus subsoil and topsoil from site. Do not remove surplus topsoil from the site prior to obtaining approval of the Owner's Representative.

I. Leave stockpile area and site clean and raked, ready to receive landscaping.

3.04 TOLERANCES

A. Maximum Variation from Proposed Elevation: 1/2 inch.

3.05 PROTECTION

A. Protect finished work under provisions of Section 016500.

B. Protect landscaping and other features remaining as final work.

C. Protect existing structures, fences, roads, sidewalks, paving and curbs. Any damage caused by the Contractor to any of these items shall be repaired promptly by the Contractor at no additional cost to the Owner.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Seeding.

B. Mulch, fertilizer and other accessories.

C. Maintenance.

1.02 RELATED SECTIONS

A. Section 329119 - Topsoil Placement and Grading.

1.03 REFERENCES

A. FS O-F-241 - Fertilizers, Mixed, Commercial.

1.04 DEFINITIONS

A. Weeds: Include Dandelion, Jimsonweed, Quackgrass, Horsetail, Morning Glory, Rush Grass, Mustard, Lambsquarter, Chickweed, Cress, Crabgrass, Canadian Thistle, Nutgrass, Poison Oak, Blackberry, Tansy Ragwort, Bermuda Grass, Johnson Grass, Poison Ivy, Nut Sedge, Nimble Will, Bindweed, Bent Grass, Wild Garlic, Perennial Sorrel and Brome Grass.

1.05 SUBMITTALS

A. Product Data: Provide data on seed mixtures, fertilizer and lime.

B. Certificates: Provide certificates indicating that all fertilizer, pesticides and herbicides comply with all applicable regulatory agency requirements.

1.06 OPERATION AND MAINTENANCE DATA

A. Maintenance Data: Include maintenance instructions, cutting method and maximum grass height; types, application frequency, and recommended coverage of fertilizer.

1.07 QUALITY ASSURANCE

A. Seed: Provide seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

1.08 REGULATORY REQUIREMENTS

A. Comply with applicable regulatory agencies for fertilizer, pesticide and herbicide composition.

B. All fertilizer, pesticides and herbicides to be used shall comply with all applicable regulatory agency requirements.

1.09 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, protect and handle products to site under provisions of Section 016500.

B. Deliver grass seed mixture in original sealed containers. Seed in damaged packaging is not acceptable.

C. Deliver fertilizer in waterproof bags showing weight, chemical analysis and name of manufacturer.

1.10 ENVIRONMENTAL REQUIREMENTS

A. Do not sow immediately following rain, during windy periods or if ground is frozen.

B. Do not sow when the ambient temperature is expected to drop below 40 degrees F or rise above 90 degrees F during the time in which the seed will establish itself.

C. Planting Season: April 1st through May 15th or September 1st through October 15th.

1.11 COORDINATION

A. Coordinate with grading and placement of topsoil.

B. Coordinate with installation of underground sprinkler system piping and watering heads.

1.12 WARRANTY

A. Include coverage for one continuous growing season; reseed areas of dead or unhealthy grass at no additional cost to the Owner.

1.13 MAINTENANCE SERVICE

A. Maintain seeded areas immediately after placement until grass is well established and exhibits a vigorous growing condition, as determined by at least two cuttings, or until the job is accepted by the Owner, whichever occurs last.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Seed: Dry, fresh, re-cleaned seed of the latest crops and of the following proportions:

Grass Type	% of Mixture	Minimum % Purity	Minimum % Germination
Kentucky Bluegrass	45	90	80
Creeping Red Fescue	45	97	80
Perennial Rye Grass	10	95	95

2.02 ACCESSORIES

A. Mulching Material: Hemlock species wood cellulose fiber, dust form, free of growth or germination inhibiting ingredients.

B. Fertilizer: FS O-F-241, Type I, Grade A; recommended for grass, with fifty percent of the elements derived from organic sources; of proportion necessary to eliminate any deficiencies of topsoil, to the following proportions: Nitrogen 10 percent, phosphoric acid 6 percent, soluble potash 4 percent.

C. Limestone: Ground dolomitic limestone containing a minimum of 90 percent calcium and magnesium carbonates. One hundred percent (100%) shall pass a No. 10 mesh screen and a minimum of 50 percent shall pass a No. 100 mesh screen.

D. Peat Moss: Shredded, loose, sphagnum moss; free of lumps, roots, inorganic material or acidic materials; minimum of 90 percent organic material measured by oven dry weight; pH range of 4 to 5 percent; moisture content of 30 percent; with moisture absorptive capacity of 450 to 500 percent.

E. Water: Clean, fresh and free of substances or matter which could inhibit vigorous growth of grass.

F. Stakes: Softwood lumber, chisel pointed.

G. String: Inorganic fiber.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify existing substrate and site conditions.

B. Verify that prepared soil base is ready to receive the work of this section.

C. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

A. Rake topsoil smooth.

3.03 APPLICATION

A. Apply fertilizer at a rate of 21 lbs per 1,000 square feet.

B. Do not apply fertilizer at same time or with same machine as will be used to apply seed.

C. Mix thoroughly into upper 2 inches of topsoil and water lightly to aid the dissipation of fertilizer.

D. Apply seed at a rate of 4 lbs per 1000 sq ft evenly in two intersecting directions. Rake in lightly.

E. Do not seed areas in excess of that which can be mulched on same day.

F. Roll seeded area with roller not exceeding 100 lbs per foot of width.

G. Immediately following seeding and compacting, apply mulch at a rate of 92 lbs per 1,000 square feet. Maintain clear of shrubs and trees.

H. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil. Discontinue watering if washing begins to occur.

I. Identify seeded areas with stakes and string around area periphery. Set string height to 24 inches. Space stakes at 8 feet on center.

J. Cover seeded slopes where grade is 30 percent or greater with erosion fabric. Roll fabric onto slopes without stretching or pulling.

K. Lay fabric smoothly on surface, bury top end of each section in 6 inch deep excavated topsoil trench. Provide 12 inch overlap of adjacent rolls. Backfill trench and rake smooth, level with adjacent soil.

L. Secure outside edges and overlaps at 36 inch intervals with stakes.

M. Lightly dress slopes with topsoil to ensure close contact between fabric and soil.

N. At sides of ditches, lay fabric laps in direction of water flow. Lap ends and edges minimum 12 inches.

3.04 MAINTENANCE

A. Maintain grass until job is accepted by the Owner or until the grass exhibits a vigorous growing condition, as determined by at least 2 cuttings, whichever occurs last.

B. Mow grass at regular intervals to maintain at a maximum height of 2-1/2 inches. Do not cut more than 1/3 of grass blade at any one mowing.

C. Neatly trim edges and hand clip where necessary.

D. Immediately remove clippings after mowing and trimming.

E. Water to prevent grass and soil from drying out.

F. Immediately reseed areas which show bare spots.

3.05 PROTECTION

A. Protect seeded areas with warning signs during maintenance period.

END OF SECTION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Water Utility Pipe

B. Special Castings; Mechanical Joint Fittings

C. Buried Valves & Valve Boxes

1.02 RELATED SECTIONS

A. Section 312333 - Trenching

B. Section 312323 - Backfilling

1.03 REFERENCES

A. ANSI/AWWA C104 - Cement-Mortar Lining for Ductile Iron Pipe and Fittings for Water.

B. ANSI/AWWA C110 - Ductile Iron and Grey Iron Fittings.

C. ANSI/AWWA C111- Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.

D. ANSI/AWWA C150 - Thickness Design of Ductile Iron Pipes

E. ANSI/AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast for Water Service.

F. ANSI/AWWA C153 - Ductile-Iron Compact Fittings for Water Service.

G. ANSI/AWWA C504 - Rubber Seated Butterfly Valves.

H. ANSI/AWWA C509 - Resilient Seated Gate Valves for Water Supply Service.

I. ANSI/AWWA C515 - Reduced-Wall Resilient-Seated Gate Valves for Water Supply Service.

J. ANSI/AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.

1.04 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Product Data: Provide data on pipe materials, pipe fittings, valves and accessories.

C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

D. Submit Operations and Maintenance Manuals for valves prepared in accordance with the requirements contained in Section 017823 - Operating and Maintenance Data.

1.05 PROJECT RECORD DOCUMENTS

A. Accurately record actual locations of water mains, valves, fittings, connections, and invert elevations.

B. Identify and describe unexpected variations to subsoil conditions or discovery of uncharted utilities.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with the local water utility company requirements.

B. The tone-out, mark-out, locating and verification of existing utilities on private property and within public Right-of-Ways are the responsibility of the contractor. All known utilities and facilities shall be verified by test holes or other means prior to commencing water main installation. No compensation will be paid to the contractor for lost time due to improper or inadequate utility investigation.

C. Conform to the standard traffic requirements of the New York State Manual of Uniform Traffic Control Devices for work in Public Roadways.

D. Valves: Manufacturer's name and pressure rating marked on valve body.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect and handle products to ensure they are kept free from damage.

B. Store piping and valves to ensure that their interiors are kept free of debris, organics or animals.

C. Deliver and store valves in shipping containers with labeling in place.

PART 2 - PRODUCTS

2.01 WATER UTILITY PIPING

A. Cement-Lined Ductile Iron Pipe
   1. Manufacturers:
      a. US PIPE
      b. McWANE DUCTILE
      c. AMERICAN PIPE
   2. Cement-Lined Ductile Iron Pipe meeting AWWA C150/C151 :
      a. Special Class 52 for all pipe 14 inches and smaller.
   3. Interior lining shall be double-thick cement with a minimum thickness of 1/8" (125 mils) in accordance with AWWA C104.
   4. Exterior of pipe shall have an exterior bituminous coating measuring 1 mil in thickness and be marked with the manufacturer name, date of casting and pressure class.

B. Pipe Accessories:
   1. Joints: ANSI/AWWA C111, vulcanized rubber gaskets for push-on pipe; mechanical joint with rods and retainer glands for fittings.
   2. Field lock gaskets by US Pipe Model 350 or approved equal shall be utilized on the last push-on joint of all dead-end mains, where a bell falls within 10 feet of a mechanical joint connection or as indicated on the plans.
   3. Gaskets shall be free from porous areas, foreign materials and visible defects. No reclaimed rubber shall be used
   4. Lubricant for Joints: Nontoxic, NSF-61 certified, shall not support the growth of bacteria, and shall have no deteriorating effects on the gasket or pipe material.
   5. Wedges: Bronze, installed at each push-on joint. (CLDIP only)
   6. Electro-Magnetic Marking Tape: (PVC only)

2.02 SPECIAL CASTINGS

A. Manufacturers:
   1. US PIPE
   2. SIGMA CORP.
   3. TYLER UNION
   4. APPROVED EQUAL

B. Material:
   1. Fittings shall be in accordance with ANSI/AWWA C153 (compact).
   2. Fittings shall be ductile iron.
   3. Ductile iron fittings shall have a pressure rating of 350 psi.
   4. Fittings shall be cement lined.

C. All fittings shall be manufactured domestically with the United States.

D. Mechanical Joint fittings shall be used with "push-on" joint pipe with the joint conforming to AWWA Specifications.

E. Rubber gaskets shall be used at each pipe connection. Rubber gaskets shall be vulcanized rubber that is free of porous areas, foreign materials and visible defects. No reclaimed rubber shall be used. The size, mold number, gasket manufacturer's mark, the letters "MJ" and the year of manufacture shall be molded in the rubber.

F. Wedge type restraining glands shall be required at all mechanical joints.
   1. Manufacturer:
      a. EBAA IRON WORKS
      b. FORD METER BOX CO.
      c. SIGMA CORPORATION
      d. TYLER UNION
      e. US PIPE
      f. Approved equal
   2. Wedge type restraining glands shall be secured to fittings using alloy steel T-head bolts and hex-head nuts.

2.03 BURIED VALVES

A. Resilient Wedge Gate Valves (up to 12”)
   1. Acceptable Manufacturers:
      a. MUELLER COMPANY; A-2361/2362 (M.J. x M.J. Connections)
      b. CLOW VALVE COMPANY; Model 2639
      c. KENNEDY VALVE CO.; Model KS-FW(8571)/KS-RW(7571)
   2. All vertical gate valves up to and including 12-inch diameter shall conform to latest revision of AWWA Specification C509 or C515, and shall be specified as follows:
      a. Material: Ductile Iron body, bronze mounted.
      b. Pressure: 250 psi minimum working pressure.
      c. Wedge: Cast iron wedge with urethane rubber coating (encapsulated). The rubber/metal bond shall be tested to meet ASTM D429.
      d. Stem: Forged bronze, non-rising stem with two "O" ring seals.
      e. Wrench Nut: Two-inch square (at base) wrench nut opening to the left or counterclockwise.
      f. Mechanical Joint Ends: Mechanical joint ends complete with all joint accessories including rubber gaskets.

g. Painting: The body and bonnet shall be coated with a fusion coating both interior and exterior to meet AWWA Standard C550.
h. Markings: Markings shall be cast on the bonnet or body of each valve, and shall show the manufacturer's name or mark, the year the valve casting was made, the size of the valve, and the designation of working water pressure for 4 to 12-inch valves.
i. Affidavit of Compliance: The Contractor shall have the manufacturer provide an affidavit directly to the Owner's Representative that all valves supplied on this project comply with all applicable provisions of AWWA Specification C509, and that each valve was subjected to and passed the 500 psi hydrostatic test without leakage. No final payment for valves will be made until this Affidavit of Compliance is received by the Owner's Representative.

B. Valve Boxes
1. Manufacturer:
a. BINGHAM & TAYLOR
b. SIGMA CORPORATION
c. TYLER UNION
2. Valve boxes shall be two piece, sliding type with 8" x 5-1/4" cast iron flanged bottom section, 9" x 6-1/8" ductile iron top section and 7" ductile iron drop lid with "WATER" cast on cover.

2.04 TAPPING SLEEVES

A. Manufacturers:
1. MUELLER COMPANY; Model H-304MJ
2. POWERSEAL PIPELINE PRODUCTS; Model 3490MJ
3. ROMAC; SST-MJ
4. Sleeves shall be constructed with integral mechanical joint outlet.
5. Material:
a. Shell Material: 304 Stainless Steel
b. Neck Material: Heavy Gage 304 Stainless Steel
c. Shell Hardware: 304 Stainless Steel
d. Mechanical Joint Hardware: High Strength Lowe Alloy Steel T-Bolts with hex nut and plastic or neoprene washer.
e. Gasket: Virgin SBR Reinforced Rubber.
6. Sleeves shall be rated with a maximum working pressure of 250 psi.

2.05 FLEXIBLE EXPANSION JOINTS

A. Products:
1. FLEX-TEND as Manufactured by EBAA Iron, Inc. Eastland, TX, U.S.A.
2. Approved Equal

B. Flexible expansion joints shall be installed in the locations indicated on the drawings and shall be manufactured of ductile iron conforming to the material requirements of ASTM A536 and ANSI/AWWA C153/A21.53. Foundry certification of material shall be readily available upon request.

C. Each flexible expansion joint shall be pressure tested prior to shipment against its own restraint to a minimum of 350 psi (250 psi for flexible expansion joints 2 inch and 30 inches diameter and larger.) A minimum 2:1 safety factor, determined from the published pressure rating, shall apply. Factory Mutual Approval for the 3 inch through 12 inch sizes is required.

D. Each flexible expansion joint shall consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum per ball deflection of: 20º, 2” - 12”; 15º, 14” - 36”; 12º, 42”-48” and 4-inches minimum expansion. Additional expansion sleeves

shall be available and easily added or removed at the factory or in the field. Both standardized mechanical joint and flange end connections shall be available.

E. All internal surfaces (wetted parts) shall be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C213. Sealing gaskets shall be constructed of EPDM. The coating shall meet ANSI/NSF-61.

F. Exterior surfaces shall be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of ANSI/AWWA C116/A21.16.

G. Appropriately sized polyethylene sleeves, meeting ANSI/AWWA C105/A21.5, shall be included for direct buried applications.

PART 3 - EXECUTION

3.01 INSTALLATION - PIPE

A. Remove scale and dirt, on inside and outside, before assembly.

B. Bevel plain ends of cut pipe at push-on joints.

C. Excavate pipe trench in accordance with Section 312333 for work of this section. Hand trim excavation for accurate placement of pipe to elevations indicated.

D. Place bedding material at trench bottom; level fill materials in one continuous layer not less than 6 inches compacted depth; compact to 95 percent maximum dry density.

E. Maintain optimum moisture content of bedding material to attain required compaction density.

F. The Contractor shall be responsible for verifying the location of the existing water mains and other utilities along the entire route of the project.

G. The Contractor must have experienced personnel in his employ to perform the cut-ins and connections to the existing water mains and have available equipment necessary for cutting ductile iron, cast iron, asbestos cement and miscellaneous piping in the existing distribution system.

H. Suitable facilities shall be available for proper dewatering, drainage and disposal of water removed from dewatered lines and excavations, without damage to adjacent properties. Exposed ends of the water main shall never be submerged either partially or fully.

I. Maintain a 10 foot horizontal and 18 inch vertical separation of water main from all storm and sanitary sewer facilities. The Contractor shall install the water main with the minimum cover indicated in the Contract Documents. The Contractor shall verify the depth of any existing service laterals to the structures prior to crossing of same.

J. Pipe trenches shall be of minimum width and allow six (6) inches on each side of the bell with sufficient width to allow straight alignment of pipe and provide sufficient room for jointing as required and to allow the backfill to be placed as specified.

K. Only new full-lengths of pipe shall be delivered to and utilized on this project. Field cut pieces with bell ends shall be a minimum of 5 feet in length. Smaller pieces shall not be permitted for use and shall be removed from site.

L. Pipe shall be laid with the bell end facing in the direction of laying. Where pipe is laid on a grade of 10% or greater, the laying shall start at the bottom and shall proceed upward with the bell ends of the pipe up gradient.

M. Install pipe to indicated elevation to within tolerance of 1/2 inch.

N. Clean bell end of pipe prior to placing gasket. Apply lubricant to both gasket and plain end of pipe.

O. Do not field cut pipe within 24 inches of bell or 8 inches of spigot end. Verify the pipe diameter of cut end.

P. Route pipe in straight line where possible. Joint deflections are permitted as outlined in ANSI/AWWA C600.

Q. Install and test ductile iron piping and fittings to ANSI/AWWA C600.

R. For installation of CLDIP, at each joint, two serrated silicon bronze wedges shall be driven into the rubber gasket after the pipe is pushed into place. The wedges shall be installed on opposite sides of the joint on a horizontal plane. Both wedges shall be started in together and driven with a hammer with blows on alternate sides so as not to displace the spigot end to one side of the pipe.

S. Establish elevations of buried piping to ensure not less than 4 feet of cover unless otherwise indicated on plans or specifically approved by the Owner's Representative or Owner in field.

T. Trench widths shall not exceed the following authorized widths prior to cut-back:
   1. Less than 12-inches diameter mains: 30 inches
   2. 12-inch & 16-inch diameter mains: 36 inches

U. Pavement removal shall be kept to a minimum and not exceed the preceding authorized widths. Sawing, drilling or chipping shall be used to ensure the breakage of pavement along straight lines. Final restoration limits shall include a 12-inch cut-back on all sides of the trench.

V. Backfill trench in accordance with Section 312323. Backfill around sides and to top of pipe with fill, tamped in place and compacted to 95 percent maximum dry density.

W. Restore, replace and/or reposition all decorative lawn ornaments, and miscellaneous items disturbed during water main installation including but not limited to the following: stones, brick driveway pavers, fences, signs, sprinklers, shrubs and trees.

3.02 DISINFECTION AND BACTERIA SAMPLING OF WATER UTILITIES

A. Flush and disinfect system in accordance with Section 331300.

3.03 PRESSURE TESTING

A. Perform hydrostatic pressure testing after disinfection, but prior to bacteria sampling.

B. Expel all air from piping system, including pipe, valves and appurtenances. All new water mains shall be pressure tested to a minimum of 150 psi or 1.5 times line pressure, whichever is greater. The pressure test shall be held for a minimum of two hours with no leakage.

C. Remove and replace any defective pipe, fittings, valves, and appurtenances. Repeat pressure test until satisfactory to Owner's Representative.

3.04 INSTALLATION - SPECIAL CASTINGS

A. Tighten glands in accordance with manufacturers direction.

B. Ensure that fittings are free of dirt and debris prior to installation.

C. Support fitting with solid blocking in areas of over excavation. Wood wedges, blocking and supports are prohibited.

D. The contractor shall install a minimum of two ¾-inch steel tie rods on mechanical joint fittings. Additional tie-rods may be requested on vertical pipe or by the Owner's Representative in areas of high pressure.

E. Steel tie rods shall be secured to fittings using 3/4" steel eye-bolts, washers and nuts. The use of ductile iron "Duc-Lugs" is prohibited. Steel tie rods shall be secured to pipe using half-moon pipe clamps, restraints, washers and nuts.

F. Bell ends of pipe shall not be installed within 5 feet of a mechanical joint assembly without being further restrained by locking gaskets or tie rods.

G. Concrete blocking shall be applied on all pipe lines 4-inch in diameter and larger at all hydrants, tees, plugs, caps, and at bends deflecting 22-1/2 degrees or more. Blocking shall be placed between solid ground and the fitting to be anchored. The blocking shall be so placed that the pipe and fitting joints will be accessible for repair. Size of blocking and minimum bearing area shall be in accordance with the Bearing Area Table within this specification section.

H. Form and place concrete for thrust blocks at each elbow or change of direction of pipe.

BEARING AREA TABLE

Pipe Size	Dead End of Tee	90 Degree Bend	45 Degree Bend	22½ Degree Bend
4 in	1 ft2	1 ft2	3/4 ft2	½ ft2
6 in	2 ft2	3 ft2	2 ft2	1 ft2
8 in	4 ft2	5½ ft2	3 ft2	1½ ft2
10 in	6 ft2	8½ ft2	4½ ft2	2½ ft2
12 in	9 ft2	12 ft2	6½ ft2	3½ ft2
>16 in	15 ft2	22 ft2	12 ft2	6 ft2

I. Concrete for Thrust Blocks: Portland Cement Concrete; 2,000 psi minimum strength at 28 days. Solid precast concrete blocking meeting the compressive strength requirement shall also be acceptable for use. When solid blocking is utilized, the contractor shall fill all annular spaces with cement or mortar. The use of wood wedges or blocking is not permitted.

3.05 INSTALLATION - VALVES

A. Set valves on solid bearing.

B. Contractor is responsible for ensuring that all valve boxes are plumb and centered over the operating nut until after final asphalt restoration is complete.

C. Contractor shall adjust boxes prior to final restoration. The use of "Rite-Hite" type adapters is not permitted on new construction.

3.06 INSTALLATION - TAPPING SLEEVES

A. Clean existing pipe thoroughly to remove dirt and scale prior to installation of gasket.

B. Ensure gasket is free from tears and debris.

C. Tighten hardware in accordance with manufacturer's recommendations.

D. Tapping valve shall be installed level to grade to ensure access with valve box. Support valve during tapping operations and afterwards with solid concrete blocking.

3.07 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed in accordance with Owner requirements.

B. Leakage testing shall be in accordance with ANSI/AWWA C600.

C. Compaction testing shall be in accordance with ANSI/ASTM D1557.

D. If tests indicate work does not meet specified requirements, remove work, replace and retest at no cost to Owner.

END OF SECTION

PART 1 GENERAL

1.01 SCOPE

A. This section covers the requirements for supplying all labor, material and equipment required to design, fabricate, deliver, erect and test one glass-fused-to-steel style water storage tank, on a drilled in micro-pile foundation, in accordance with the plans, these specifications and the standard specifications of the American Water Works Association AWWA D103 and the Building Code of New York State - Latest Edition. The tank contractor must maintain a shop or shops for assembling and fabrication of the materials as well as performing the service of erection of such a structure and be able to show recent experience in the erection of five tanks of this style in sizes as large as that specified within the last 5 years.

B. The tank structure shall include a concrete foundation, floor, and other appurtenances as shown on the contract drawings and described herein.

C. All associated tank materials shall be supplied by the tank manufacturer. All materials shall be new and shall be free of defects.

D. The contractor shall furnish the Engineer with a copy of the bill of sale for the steel, Certificate of Compliance (C.O.C.) which indicates its origin, as well as a notarized affidavit from the steel manufacturer affirming its origin.

E. Foundation

F. Sealants

G. Tank Roof

H. Tank Accessories

1.02 RELATED SECTIONS

A. Section 033000 - Cast-In-Place Concrete

B. Section 055133.19 - Aluminum Ladders

C. Section 055213 - Aluminum Pipe and Tube Railings

D. Section 108900 - Tank Roof Vent

E. Section 316333 - Drilled Micropiles

F. Section 402323 - Potable Water Process Piping

G. Section 402324 - Valves And Valve Accessories

1.03 REFERENCES

A. American Society for Testing and Materials (ASTM)

B. American Concrete Institute (ACI)

C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel.

D. ASTM A992/A992M - Standard Specification for Structural Steel Shapes.

E. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.

F. ASTM B916 - Standard Test Method for Adherence of Porcelain Enamel Coatings to Sheet Metal.

G. ASTM C633-79 - Standard Test Method for Adhesion or Cohesion Strength of Flame-Sprayed Coatings.

H. Building Code of New York State - Latest Edition.

I. ANSI/ASCE 7 - Minimum Design Loads for Buildings and Other Structures.

J. ANSI/AWWA C652 - Standard for Disinfection of Water-Storage Facilities.

K. ANSI/AWWA D103 - Standard for Factory-Coated Bolted Steel Tanks for Water Storage.

L. American Welding Society (AWS) D1.2/D1.2M - Structural Welding Code - Aluminum.

M. Federal Specification FS TT-S-00230C - Sealing Compound: Elastomeric Type, Single Component (For Calking, Sealing, and Glazing in Buildings and Other Structures).

N. General Services Administration Commercial Item Description GSA CID A-A-59588A - Rubber, Silicone.

O. National Sanitation Foundation (NSF) Standard 61 - Drinking Water System Components.

P. Society for Protective Coatings SSPC-SP 10/NACE No. 2 - Surface Preparation Standard - Near White Metal Blast Cleaning.

Q. Society of Automotive Engineers (SAE)

R. SAE J429 - Mechanical and Material Requirements for Externally Threaded Fasteners.

S. International Organization for Standardization (ISO):
   1. ISO 28706-1:2008 - Vitreous and Porcelain Enamels - Determination of Resistance to Chemical Corrosion.
   2. ISO 2859 - Sampling Procedures for Inspection by Attributes.
   3. ISO 6370-2 - Vitreous and Porcelain Enamels - Determination of Resistance to Abrasion.

T. Occupational Safety and Health Administration (OSHA) - Part 1910 - Occupational Safety and Health Standards

1.04 QUALITY ASSURANCE

A. A site and project specific foundation designed by the tank manufacturer with the stamp of a Professional Engineer licensed and registered in the state of the specified construction shall be provided by the tank erector. The tank manufacturer shall be solely responsible for the tank structural steel and foundation design.

B. Tank Manufacturer:
   1. The tank manufacturer shall be a specialist in the design and fabrication of glass fused to steel water tanks with a minimum of ten (10) years documented experience in the United

States in similar climates, sizes and applications. The tank manufacturer shall employ a staff of full time design engineers, and shall own and operate its steel fabrication and glass coating facilities.

2. Naming of a manufacturer does not relieve them from complying with the performance features and the salient features of the contract documents. The contract documents represent the minimum acceptable standards.
3. In order to assure uniform quality and ease of maintenance, it is the intent of these specifications that all equipment under this section shall be supplied by a single manufacturer and that the equipment manufacturer and installation contractor assume the responsibility for proper installation and functioning of equipment.

C. Tank Erector
1. The tank erector/builder shall have built, on its own, a minimum of ten (10) tanks of similar type that are equal or greater in size than the specified tank, operating satisfactorily for a minimum of five (5) years and shall provide with bid the reference name, location, application and year of supply/operation of the tank.
2. Tank manufacturer and tank provider shall each provide with bid the reference name, address and telephone number of the responsible representative, application and year of supply/operation of the above referenced potable water storage tanks installed in the United States.
3. Substitute/Alternate/or equal bids will only be considered with prior approval by the engineer. All requests must be made at least five (5) business days prior to the specified bid date or they will not be considered.

D. Pile Installer shall have a minimum of five (5) years documented experience in the United States in similar soil characteristics, proposed pile type, and applications.

E. All associated tank materials shall be supplied by the tank manufacturer. All material shall be new and shall be free of defects.

F. Provide Owner and Owner's Representative a copy of all testing results, including, but not limited to: factory performed holiday testing, field performed holiday testing, and cathodic protection system testing.

1.05 SYSTEM DESCRIPTION

A. Tank Design
1. The tank shall be a factory coated glass fused to steel bolted panels and aluminum Geodesic Dome Roof, with a net capacity of 260,000 gallons above bottom capacity line.

B. Tank Foundation
1. In accordance with soil report recommendations design the required tank pile foundation. Copies of the preliminary foundation design indicating geometry, anchorage, anchor/bolt pattern, piles, approximate quantity of concrete and reinforcing steel, as well as design allowable strength for concrete and reinforcing steel, shall be included with the Contractor's bid. The Contractor shall perform additional soils investigation at his expense if deemed appropriate by the Contractor to design the tank foundation. The Contractor's design of the tank foundation shall be based on the available information and the Contractor's experience.
2. In accordance with soil report recommendations install the required tank foundation including all associated accessories and penetrations as specified.

1.06 SUBMITTALS

A. Submit under provisions of Section 013300.

B. Verify required tank overflow elevation through survey of existing tank overflow prior to its demolition.

C. Indicate welded connections using standard AWS A2.0 welding symbols.

D. Within thirty (30) days of Notice to Proceed, the tank manufacturer shall submit job specific structural calculations for tank and foundation, general arrangement drawings and product data for the tank structure, foundation, joint sealant and all appurtenances. Documentation above shall be sealed by a Professional Engineer licensed and registered in the state of the specified construction.

E. Submittals shall include certification that each applicable Section of AWWA D103 is met. Any exceptions taken shall be noted with full explanation given for the deviation. Provide a copy of this specification indicating where the proposed equipment does not adhere to the specification, provide information on the exception and how the proposed equipment would be brought into adherence with the item required.

F. The tank manufacturer shall provide documentation upon request, including mill reports and traceable documents to demonstrate the source of steel used in the manufacture of this project specific tank.

G. Foundation Design: Submit required tank foundation design in accordance with attached soil report. Foundation design shall be sealed by a Professional Engineer licensed and registered in the state of the specified construction. Design shall include geometry, anchorage, anchor/bolt pattern, approximate quantity of concrete and reinforcing steel, concrete mix design, allowable strength for concrete and reinforcing steel.

H. Erection Drawings: Submit tank manufacturer’s erection drawings, including plans, elevations, sections, and details, indicating roof framing, transverse cross-sections and accessory installation details to clearly indicate proper assembly of tank components.

I. Submit detailed, coordinated and reviewed shop drawings for all structural steel prior to fabricating steel. The shop drawings shall bear the stamp of the contractor showing that the shop drawings have been reviewed by them.

J. A tank assembly guide, prepared by the tank manufacturer to familiarize the Engineer and Owner's Representative with basic building procedures. As a minimum, the guide shall include: Safety Guidelines; Building Tools, Equipment, and Material; Footing and Foundation Construction; Floor Construction; Roof Installation; Appurtenance Installation.

K. Representative sample of “edge coating” and “glass coating” used on the proposed tank.

L. Product Data: Submit product data for all tank appurtenances including influent piping, manways, overflow piping, weir box and anchor bolts including installation instructions and operation and maintenance manuals.

M. Tank Color: Tank interior shall be manufacturer's standard white finish. Tank exterior color shall be selected by the Owner from the manufacturer's standard color chart. A minimum of five exterior finish colors shall be available to choose from.

N. Handrails & Platforms: Shop Drawings shall include the following items:
   1. Profiles, sizes, connection attachments, and accessories for railings.
   2. Catalog cuts of all railings components.
   3. Detail of toe plate anchorage.
   4. Catalog cuts for anchorage hardware. Indicate size and type of anchorage hardware.
   5. Samples of all components, bases, toe plate, mounting brackets and pipe.

6. Storage, handling and installation instructions.
7. Shop drawings shall bear the seal and signature of a registered Professional Engineer licensed in the state of the specified construction.

O. Tank Access Ladder(s): Submit shop drawings indicating profiles, sizes, connection attachments, reinforcing, anchorage, fastener size and type, and accessories. Indicate net weld lengths.

P. Safety Climb System: Submit Product data and indicate special procedures and methods required for proper installation of the safety climbing system.

Q. Ladder Vandal Guard: Submit Product data and indicate special procedures and methods required for proper installation of the vandal deterrent.

R. Tank Vent: Submit shop drawings indicating profiles, sizes, connection attachments, reinforcing, size and type of fasteners, and accessories

S. Copy of Builder Certification Program, sponsored by the tank manufacturer, Certifying factory training and experience of the proposed erector.

T. All engineering costs which cause changes in design from the plans and specifications are to be borne entirely and unconditionally by the contractor.

U. Submit a copy of the bill of sale for the steel, Certificate of Compliance (C.O.C.) which indicates its origin, as well as a notarized affidavit from the steel manufacturer affirming its origin.

1.07 WARRANTY

A. If within a period of two (2) years from date of acceptance of tank by Owner, the tank structure or any part thereof proves to be defective in material or workmanship upon examination by the manufacturer, the manufacturer will supply a replacement part, will repair, or allow a credit for same at the discretion of the Owner.

B. If within a period of five (5) years from date of acceptance of tank by Owner, the portion of the tank interior below normal high water elevation shall not corrode under normal and proper use. If any portion of the tank interior below the normal high water level proves to be defective in material or workmanship upon examination by the manufacturer, the manufacturer will supply a replacement part, will repair, or allow a credit for same at the discretion of the Owner.

1.08 DELIVERY, STORAGE AND HANDLING

A. Deliver, store, protect, and handle products to the site under provisions of Section 016500.

B. Fabricate and deliver products to the site in largest sections practical.

C. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer’s original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

D. Storage and Handling Requirements:
1. Store and handle materials in accordance with manufacturer’s instructions.
2. Keep materials in manufacturer’s original, unopened containers and packaging until installation.
3. Do not store materials directly on ground.
4. Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.

5. Protect materials and finish during storage, handling, and installation to prevent damage.

1.09 PACKAGING

A. All sheets that pass factory inspection and quality control checks shall be protected from damage prior to packing for shipment.

B. Heavy paper or plastic foam sheets shall be placed between each panel to eliminate sheet-to-sheet abrasion during shipment.

C. Individual stacks of panels will be wrapped in heavy mil protective plastic and steel banded to wood pallets built to the roll-radius of the tank panels.

1.10 DESIGN LOADS

A. Tank shall be in compliance with US, State and local codes, standards and requirements. No foreign designs or codes will be accepted.

B. Tank capacity shall be 260,000 U.S. gallons, including 15 inches of design freeboard.

C. Finished floor elevation shall be as shown on the drawings.

D. Specific Gravity 1.0 - “Minimum design shall be 1.0”

E. Net allowable soil bearing capacity shall be in accordance with the included subsurface soil and foundation investigation.

F. Governing Design Code:
   1. Design criteria of the tank/foundation shall incorporate the following loads and forces; dead load, live load, snow load and wind load in accordance with AWWA D103, the Building Code of New York State - Latest Edition, and ANSI ASCE 7:
      a. Governing Building Code: Building Code of New York State - Latest Edition.

G. Roof Live Load:
   1. Roof live loads are loads produced during the life of the structure by moveable objects.
   2. Wind, snow, seismic, or dead loads are not live loads.
   3. Roof live loads are applied based on the Tributary Area as follows:
      a. 0 to 200 Square Feet: 15 psf.
      b. 201 to 600 Square Feet: Interpolation between 200 sq ft and 600 sq ft numbers.
      c. 601 Square Feet or Greater: 15 psf.

H. Roof Snow Load:
   1. Roof snow load used for designing the structure shall not be reduced and shall be the product of the following criteria:
      a. Roof Snow Load (Pf): 30 psf.
   2. Design snow load shall include the effects of minimum flat roof load limits, rain on snow, drifting snow, and unbalanced snow load as defined in the governing building code specified above.

I. Wind Load:
   1. Wind load used for designing the structure shall be the product of the following criteria:
      a. Wind Exposure Category: B
      b. Wind Velocity Pressure Exposure Coefficient (Kz): 1.27
      c. Wind Velocity (V), miles per hour: 115 mph.
      d. Wind Importance Factor (Iw): 1.15.

e. Building Wind Load (qz): 47.74 psf.

2. Wind Pressure Coefficients and the design pressures shall be applied in accordance with the governing code.

J. Seismic Load:
1. Seismic load used for designing the structure shall be based on the following criteria:
a. Seismic Use Group: III
b. Spectral response acceleration for short periods (Ss): 0.294 % g.
c. Spectral response acceleration for 1-sec. period (S1): 0.061 % g.
d. Site Class: C.
e. Seismic Importance Factor (I): 1.50.
2. Seismic loads shall be applied in accordance with the governing code.

K. Dead Load: Dead load shall consist of the weight of tank system construction, such as roof, framing, and covering members.

L. Frost Depth: 3 feet 6 inches.

M. Load Combinations: Load combinations used to design primary and secondary structural members shall be in accordance with the governing code.

N. DEFLECTIONS
1. Structural Members:
a. Maximum deflection of main framing members shall not exceed 1/180 of their respective spans.
2. The design of the tower anchorage and foundation shall include P-delta effects from lateral drift equal to three times the elastic deflection.

PART 2 PRODUCTS

2.01 WATER STORAGE TANK

A. Manufacturer
1. Statewide Aquastore, East Syracuse, NY
a. Model: 36 35

B. Tank Accessories: The tank structure shall be provided with the following:
1. Exterior access ladder. Locations and sizes shall be as shown on the drawings.
2. Roof handrails. Locations and sizes shall be as shown on the drawings.
3. Pipe connections. Locations and sizes shall be as shown on the drawings.
4. Roof vent. Location and size shall be as shown on the drawings.
5. (2) 30-inch diameter sidewall manways.
6. (2) 30-inch x 30-inch roof access hatch with a 4-inch tall curb and cover that has a 2-inch overlap.
7. Tank identification plaque.

2.02 MANUFACTURING PROCESS

A. The glass coating system shall be in full accordance with the requirements of AWWA D103. Every batch of coating frits shall be individually tested in accordance with PE1 Test T-21. (Citric acid at room temperature)

B. Surface Preparation: Following the de-coiling and shearing process, sheets shall be steel grit blasted on both sides to the equivalent of SSPC SP-10 (near white metal blast cleaning). Sandblasting and chemical pickling of steel sheets is not acceptable. The surface anchor

pattern shall be not less than 1.0 mils. (.0001 inches). Sheets shall be evenly oiled on both sides to protect them from corrosion during fabrication.

C. Cleaning: After fabrication and prior to application of the coating system, all sheets shall be thoroughly cleaned by caustic wash and hot water rinse followed immediately by hot air drying. Inspection of the sheets shall be made for traces of foreign matter, soil particles, grease or rust. Any such sheets shall be re-cleaned or grit-blasted to an acceptable level of quality.

D. Coating Application: All sidewall sheets shall receive one coat of a catalytic nickel oxide glass pre-coat to both sides, followed by air-drying.
   1. A second coat of milled cobalt blue glass shall be made to both sides of the sheets and then dried.
   2. A third cover coat of milled titanium dioxide white glass shall then be applied to the inside of the sheet and the sheet edges. This milled glass shall be formulated with titanium dioxide to produce a finish interior surface with optimum toughness and resistance to conditions normally found in potable water storage tanks. This specific coating shall be Aquastore Vitrium. Any alternate three coat system must be submitted for approval and acceptance prior to bid.
   3. The sheets shall then be fired at a minimum temperature of 1500 °F in accordance with ISO 9001 quality process control procedures, including firing time, furnace humidity, temperature control, etc.
   4. The dry film interior coating thickness shall be 10-18 mils min. The dry film exterior coating thickness shall be 7-15 mils min. This is a three coating process. The finished tank inside sidewall glass coating shall be white. The standard tank sidewall finished outside color shall not vary noticeably among tank panels. Off color panels will be rejected; replacement panels of matching color shall be supplied by the tank manufacturer. Exterior color shall be chosen by the Owner from the manufacturer's standard exterior color chart.

E. Sheet Edge Coating
   1. Prior to sheet glassing all four (4) exposed rectangular continuous sheet edges, including starter sheets, for each specific sheet radii shall be mechanically rounded in profile resulting in an optimized radius and adhere to The Porcelain Enameling Institute’s Technical Manual PEI-101.
   2. The sheet surface next to the edge must remain flat, post process, to prevent ‘bulging’ to less than 0.030 inches (0.79mm) relative to the flat, while being rolled. All (4) exposed sheet edges shall then be directionally sprayed by nozzles, using an automated machine process, and coated with the same vitreous enamel glass coating as the sheet surface.
   3. Sheet edge encapsulation shall have an enamel coating minimum DFT (dry film thickness) of 5 mils (127 microns). Coating adhesion shall be tested in accordance with ISO 28765 Class 2 or better. Sheet face and sheet edge shall meet the same glass quality test. Rounded sheet edge encapsulation shall have zero exposed uncoated steel.
   4. Sealer or glass overspray as edge coating shall not be an acceptable alternative and nozzle spray must be directionally oriented toward the edges to ensure consistency of coverage.

2.03 INSPECTION

A. The manufacturers quality system shall be ISO 9001 certified and refer to ISO (International Organization of Standardization) for the following testing and procedures. All coated sheets shall be inspected for mil thickness using an electronic dry film thickness gage with a valid calibration record. Test frequency shall be every tenth sheet and shall measure thicknesses of glass as designed.

B. All sheets shall be measured for color using an electronic colorimeter with a valid calibration record. Test frequency shall be every tenth sheet and the color must fall within the specified tolerance or it shall be rejected.

C. Holiday testing shall be performed on each panel after fabrication. Surfaces shall be inspected using a low voltage wet sponge holiday tester in accordance with ASTM D5162-91 Method A. The tester shall be used at a voltage of 67.5 volts (+/- 10 %) and set so the alarm is sounded if the electrical resistance of the glass coating falls below 125,000. The tester shall have a valid calibration record. The testing solution used to wet the sponge shall contain a low suds wetting agent added at a ratio of not more than ½ fluid oz. per gallon of water. Every sheet shall be 100% tested for holidays and any sheet with a discontinuity shall be rejected.

D. Adherence of the glass coating to the tank steel shall be tested in accordance with ISO standards. Any sheet that has poor adherence will be rejected. The minimum frequency of testing for this shall be one sheet per gage lot run.

E. Glass coating shall be tested for fishscale by placing the full size production sheets in an oven 400°F for one hour. The sheets will then be examined for signs of fishscale. Any sheet exhibiting fishscale shall be rejected and all sheets from that gage lot will be similarly tested. The minimum frequency of testing for this shall be one sheet per gage lot run.

F. Following assembly of the tank on-site, all interior and exterior surfaces of the tank below the high water line shall undergo a dry volt holiday test in the presence of the Owner. Any sheet registering a discontinuity on the interior surface shall be rejected and retested after repair or replacement.

G. Submit results of all of the above tests upon request of Owner's Representative.

2.04 PLATES AND SHEETS

A. Plates and sheets used in the construction of the tank shell, floor, or roof shall comply with the minimum standards of AWWA D103. All steel shall be smelted and produced in the United States of America.

B. The annealing effect created from the glass coated firing process shall be considered in determining ultimate steel strength. In no event shall a yield strength greater than 50,000 psi be utilized for calculations detailed in AWWA D103.

C. Design requirements for mild strength steel shall be ASTM A-1011 Grade 30 with a maximum allowable tensile stress of 14,566 psi. High strength steel shall be ASTM A-1011 Grade 50 with a maximum allowable tensile stress of 26,000 psi.

D. When multiple vertical bolt line sheets and plates of ASTM A-1011 Grade 50 are used, the effective net section area shall not be taken as greater than 85% of the gross area.

E. When Rolled Structural Shapes are used, the material shall conform to minimum standards of ASTM A36 or ASTM A992.

F. Chemical compositions for mild steel and high strength steel shall be stated in the submitted mill certifications. Raw steel for plates and sheets shall conform to the following composition requirements. These specifications refer to the design tensile strength after firing. The steel shall have the following chemical composition:

1.	Carbon (Mild)	0.06%	maximum
2.	Carbon (HSS)	0.10%	maximum
3.	Manganese	1.50%	maximum

4.	Phosphorus	0.04%	maximum
5.	Sulfur	0.05%	maximum
6.	Aluminum	0.08%	maximum

2.05 STRUCTURAL STEEL

A. All details, detailing, connections, fabrication and erection shall be in accordance with the AISC specification for structural steel buildings - 360-10.

B. All W shapes shall conform to ASTM A992 (Fy=50 KSI) specifications. All other structural steel shapes and plate shall conform to minimum ASTM A36 specifications.

C. The contractor shall submit detailed, coordinated, and reviewed shop drawings for all structural steel prior to fabricating steel. The shop drawings shall bear the stamp of the contractor showing that the shop drawings have been reviewed by them.

D. All steel pipe shall conform to ASTM A53, Grade B, specifications. HSS sections (Hollow Structural Sections) shall conform to ASTM A500, Grade B specifications.

E. All bolts shall conform to A325N specifications with threads in shear plane.

F. Welding shall conform to AWS D1.1 "Structural Welding Code - Steel", and shall be performed by certified welders. All welding electrodes shall be E70XX.

G. All exposed structural steel (floor framing & overhang form members) shall be prepared and painted in accordance with the following:
   1. Prior to painting, all the steel shall be cleaned and free of all oil, grease, dirt, etc. The surface shall be commercially blast cleaned in accordance with SSPC SP-6.
   2. Shop Primer Coat: Tnemec Hydro-Zinc Series 94-H2O, 2.5-3.5 mils DFT, or approved equal.
   3. Finish Coat: Tnemec Tneme-Fascure Series 161HS, 5.0-7.0 mils DFT, or approved equal.
   4. If structural steel is to be exposed to the exterior elements, an additional finish coat shall be applied: Tnemec Endura-Shield Series 1095, 3.0-5.0 mils DFT.

2.06 HORIZONTAL WIND STIFFENERS

A. If manufacturer determines stiffeners are required for design, they shall be of the "web truss" design, with extended tails to create multiple layers of stiffener, fabricated of steel with hot dipped galvanized coatings. Rolled angle stiffeners shall not be permitted for intermediate horizontal wind stiffeners.

2.07 BOLT FASTENERS

A. Bolts used in tank lap joints shall be 1/2-13 UNC-2A rolled thread and shall meet the minimum requirements of AWWA D103. Bolt material shall be SAE J429 Grade 2 (1” bolt length) with a tensile strength of 74,000-psi minimum, and a proof load of 55,000-psi min. and an allowable shear stress with threads excluded from the shear plane of 18,163-psi min.

B. SAE J429 Grade 5/ASTM A325 (1-1/4” bolt length) and heat treated to a tensile strength of 120,000 psi min and a proof load of 85,000 psi min. and having an allowable shear stress with threads excluded from the shear plane of 29,454 psi min.

C. SAE J429 Grade 8/ASTM A490 (bolts greater than 1-1/4”) and heat treated to a tensile strength of 150,000 psi min and a proof load of 120,000 psi min. and having an allowable shear stress with threads excluded from the shear plane of 36,818 psi min.

D. The bolt finish shall be hot-dipped galvanized.

E. The entire bolt head shall be encapsulated up to the splines on the shank with high impact polypropylene copolymer. Resin shall be stabilized with an ultraviolet light resistant material such that the color shall appear black. The bolt head encapsulation shall be certified to meet the ANSI/NSF Standard 61 for indirect additives.

F. All lap joint bolts shall be properly selected such that threaded portions will not be exposed in the "shear plane" between the sheets. In addition, bolt lengths shall be sized as to achieve a neat and uniform appearance. Excessive threads extending beyond the nut will not be permitted.

G. All lap joint bolts shall include a minimum of four (4) splines, on the underside of the bolt head at the shank in order to resist rotation during torque wrench application.

2.08 SEALANTS

A. Manufacturer:
   1. Manus Products, Inc.; Manus-Bond 75-AM LOT NSF61
   2. Approved Equal

B. The lap joint sealant shall be a one component, moisture cured, polyurethane compound. The sealant shall meet applicable FDA Title 21 regulations, and be manufactured by a United States supplier as well as be suitable for contact with potable water and shall be certified to meet ANSI/NSF Additives Standard No. 61.

C. The sealant shall be used to seal lap joints, bolt connections and sheet edge fillets. The sealant should have a curing rate at 73°F and 50% RH and be tack free in 6 to 8 hours. Final cure time should be 10 to 12 days.

D. Sealer shall be resistant up to 200-ppm chlorine concentration during disinfection. Neoprene gaskets and tape type sealer shall not be used.

E. The sealant shall cure to a rubber like consistency, have excellent adhesion to the glass coating, low shrinkage and be suitable for interior and exterior use.

2.09 GLASS FUSED TO STEEL FLOOR

A. Glass-coated bolted steel floor panels shall be assembled over a 3 inch compacted sand base contained by a concrete ring wall. Alternately, if the panels are to be set on a concrete slab, a non-extruding and resilient bituminous type of filler may be used, meeting the requirements of ASTM D1751.

B. Tank footing design shall be based on the soil bearing capacity given by the engineer, as determined by geotechnical analysis performed by a licensed soils engineer.

C. Plastic encapsulated nuts shall be used to cover the bolt threads exposed on the inside of the floor. The plastic encapsulation shall be Noryl GFN2-701S and NSF 61 compliant.

2.10 TANK ROOF

A. The tank roof shall be manufactured and furnished by the tank manufacturer.

B. Roofs shall be clear span and self-supporting. Center post supports are not permitted. Roof live loads and dead loads shall be carried by tank sidewalls, without additional support.

C. Aluminum Dome Roof
   1. Aluminum dome roofs shall be aluminum in color and shall be constructed of non-corrugated, triangular aluminum panels sealed and firmly clamped in an interlocking manner within a fully triangulated aluminum space truss system of wide flange extrusions, thus forming a dome structure. Fabric type flashing is not allowed.
   2. The dome shall be self-supporting from the periphery structure with horizontal thrust contained by an integral tension ring.
   3. Dome Materials:
      a. Triangulated dome frame struts: 6061-T6 aluminum.
      b. Structural frame gussets: 6061-T6 aluminum, 0.375 inch nominal thickness.
      c. Triangular closure panels: .050 inch nominal thickness, 3003-H16 aluminum Sheet.
      d. Perimeter tension/compression ring: 6061-T6 aluminum.
      e. Fasteners: 7075-T73 anodized aluminum or Series 300 stainless steel.
      f. Sealant: Silicone by Pecora, General Electric Silpruf or equal.
      g. Gaskets: Silicone, General Electric SE-44/88 or equal.
      h. Anchor Fasteners: Series 300 stainless steel.
      i. Dormers, doors, and hatches: 6061-T6, 5086-H34 or 5052-H36 aluminum, 0.090inch nominal thickness.

D. The roof supplier shall perform all manufacturing work described herein with mechanics skilled and experienced in the fabrication of roof structures. Fabrication shall be done in an ISO 9001 certified facility.

2.11 ROOF HATCH

A. Tank shall be provided with two (2) 30-inch square single leaf aluminum roof access hatch as shown on contract drawings per AWWA D103. The access hatch and roof shell reinforcing shall comply with AWWA D103.

B. Manufacturer:
   1. The Bilco Company
   2. Halliday Products
   3. Approved Equal

C. Performance characteristics:
   1. Cover shall be reinforced to support a minimum live load of 40 psf with a maximum deflection of 1/150th of the span or 30 psf wind uplift.
   2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
   3. Operation of the cover shall not be affected by temperature.
   4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.

D. Cover: Shall be 11 gauge aluminum with a 3” beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb. Curb shall have a downward overlap of 2".

E. Curb: Shall be 4” minimum in height and made of 11 gauge aluminum. The curb shall be equipped with an integral aluminum cap flashing of the same gauge as the curb, fully welded at the corners.

F. Provide compression spring operators enclosed in self-lubricating telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris

inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.

G. Provide compression spring operators enclosed in self-lubricating telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe welded to the curb assembly.

H. Fall Protection Grating:
   1. Grating panel(s) shall be fiberglass, molded in one piece, with load bearing bars in both directions to allow for use without continuous side support.
   2. Panel shall be designed to support a 300 PSF live load and be high visibility safety yellow in color.
   3. Torsion rod lift assistance shall be provided for ease of operation and a hold open arm shall be included to automatically lock the panel in the fully open 90 degree position.
   4. A release handle shall be provided to close the grating panel and there shall be a provision to lock the panel to prevent unauthorized access.
   5. Hold open arm shall be aluminum with a stainless steel release handle.
   6. All other hardware, including mounting brackets, hinges, torsion rod, padlock loop, and fasteners, shall be type 316 stainless steel.
   7. Manufacturer shall provide a twenty-five year warranty against defects in material and workmanship.

I. Hardware:
   1. Heavy duty Stainless Steel pintle hinges shall be provided.
   2. Roof hatch shall be equipped with exterior padlock hasps.
   3. Roof hatch shall be equipped with an exterior lifting handle.
   4. The latch strike shall be a stamped component bolted to the curb assembly.
   5. Covers shall automatically lock in the open position with a rigid hold open arm equipped with a 1” diameter red vinyl grip handle to permit easy release for closing.
   6. Compression spring tubes shall be an anti-corrosive composite material and all other hardware shall be zinc plated and chromate sealed. Springs shall have an electro-coated acrylic finish for corrosion resistance.
   7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover.

J. Finish: Factory finish shall be mill finish aluminum.

2.12 TANK ROOF VENT

A. Materials: Fully weatherproof and freeze proof; aluminum construction; designed to prevent the ingress of birds, animals, insects, dust, and water.

B. Screen shall be ¼-inch T316 stainless steel mesh.

C. Minimum capacity: 1,000 CFM

D. Fabricate vent to be freeze proof and to provide sufficient air capacity during maximum rate of inflow or outflow of water to the tank so that dangerous pressures do not develop

2.13 HANDRAILS & PLATFORMS

A. Manufacturer
   1. Handrails:

a. Holleander Speed Rail System
b. Approved equal.

2. Platforms
a. McNichols Co.
b. Approved equal.

B. Design:
1. All railings, posts, balusters, mounting brackets, and fittings shall resist a singular concentrated lateral force of two hundred (200) lbs. in any direction at any point along the top without loosening, damage or misalignment.
2. All railings, posts, balusters, mounting brackets, and fittings shall resist lateral force of fifty (50) lbs. per linear foot at any point along the top rail, in any direction without damage or misalignment.
3. Intermediate rails, posts, balusters, filler panels, etc. shall resist a horizontal force of fifty (50) lbs. on an area not to exceed one (1) square foot including openings and space between rails.
4. All railings, posts, balusters, mounting brackets, and fittings shall conform to the requirements in ASTM E985.
5. Toe plates shall conform to OSHA standards.

C. Materials:
1. Install aluminum handrails and platforms at to dimensions and locations shown on the contract drawings.
2. Posts and railings for the handrail shall be 1-1/2 inch outside diameter. Schedule 40 aluminum pipe alloy 6063-832, ASTM B241, ASTM B221 or ASTM B429.
3. Toe plates shall be installed at all interior locations and they shall be shipped loose in stock lengths with pre-manufactured corners for field installation.
4. Toe plates shall be a minimum four (4) inches high and shall be an extrusion that attaches to the posts with clamps that allow for expansion and contraction between the posts.
5. Posts shall not interrupt the continuation of the top rail at any point along the railing, including corners and end terminations. The top surface of the top railing shall be smooth and shall not be interrupted by projected fittings.
6. Railings shall be installed using stainless steel bolts, size as required by the manufacturer. All bolts shall be stainless steel type in conformance with ASTM F593 and F594 and shall be furnished by the Contractor.
7. Mesh shall be 1”x1” aluminum mesh.
8. Finish shall be Aluminum Association M10-C22-A41 (215-R1).
9. Aluminum surfaces in contact with concrete, grout, or dissimilar metals shall be protected with a coat of bituminous paint, Mylar isolators, or other approved materials. The coating shall be factory applied.
10. Ladder step-off platforms shall be fabricated of aluminum.

D. Fabrication
1. Fit and shop assemble components in largest practical sizes for delivery to the site.
2. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation
3. Provide anchors and mounting brackets required for connecting railings to the surrounding construction.
4. Install aluminum shims to compensate for unevenness in surfaces. Railing shall be straight and true.
5. Exposed mechanical fasteners shall be flush countersunk; unobtrusively located; consistent with design of railings, except where specifically noted otherwise.
6. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.

7. Grind exposed joints flush and smooth with adjacent finish surface. Exposed joints shall be butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
8. Accurately form components to each other and to surrounding construction.
9. Accommodate for expansion and contraction of members and structures without damage to connections or members.
10. Anchor railings with mounting brackets supplied by the manufacturer

2.14 TANK ACCESS LADDERS

A. Access Ladders: Tank access ladders shall be furnished and installed as shown on the contract drawings. Ladders shall be aluminum and utilize grooved, skid-resistant rungs. Ladder shall be fabricated to support a concentrated live load of 250 lb. acting anywhere on the ladder and a concentrated live load of 80 lb. acting on each rung simultaneously with a maximum deflection of 1/240 of span without damage or permanent set. Provide platforms as described in section HANDRAILS & PLATFORMS.

B. Access Ladder Accessories:
1. The tank ladder shall be furnished with a stainless steel, self-closing safety gate at the top of the ladder. Safety gate shall be Cotterman, Model AG2440S with stainless steel hardware.
2. The tank ladder shall be furnished with a stainless steel fall protection device which allows the climber hands-free operation whether ascending or descending. Device shall include stainless steel cables, sleeve, brackets, and hardware. See Section 108905 - Climbing Safety Device for Additional Information.
3. The tank ladder shall be furnished with an 8 foot tall aluminum vandal guard. Vandal guard shall be by RB Industries.
4. Provide two (2) full body climbing harnesses and lanyards. See Section 108905 - Climbing Safety Device for additional information.

C. Extend side rails a minimum of 42 inches above any platforms and landings.

2.15 TANK ACCESSORIES

A. Pipe Connections: Where pipe connections are shown to pass through tank panels, pipe shall utilize an interior and exterior flange assembly. Tank shell reinforcing shall comply with AWWA D103. Manus Sealer No. 75-AM LOT NSF61 shall be applied to sheet edges and on any cut panel edges or bolt connections.

B. (1) Active Influent/Effluent Potable Water Pipe: 16-inch diameter constructed of cement-lined ductile iron, Special Class 51 in accordance with Section 331411. Location shall be as shown on the drawings.

C. (1) Type 316, Schedule 10S stainless steel 12-inch tank overflow pipe. Location shall be as shown on the drawings. The welded stainless steel overflow pipe shall be a minimum of 1.98 mm wall thickness, and fitted with an adequate anti-vortex entrance detail. It shall be routed as indicated on the plans. It shall be designed and constructed to accommodate a minimum flow of 13,231 gallons per minute at a velocity of 37.5 feet per second. Pipe flanges shall be same material as the pipe.

D. Level Indicator - Tank shall be provided with a liquid level indicator (Full Travel).

E. Sidewall Access Hatch: Tank shall be provided with a bottom access manway. The access hatch and tank shell reinforcing shall comply with AWWA D103. A davit shall hold the cover plate.

F. Tank Identification Plaque.

G. Anchor Bolts: Type 316 stainless steel

2.16 CATHODIC PROTECTION SYSTEM

A. The tank manufacturer will provide a passive cathodic protection system designed specifically for the project tank based on site specific water quality analysis (performed by the contractor), consisting of sacrificial anodes which provide protection for the portion of the structure immersed in liquid. The anodes are attached to the floor, and bolted through existing shell sheet bolt holes. Lead wires and buss bars are used to ensure continuity between anodes and all structure shell sheets.

B. The lightening protection system shall be designed by a licensed professional engineer employed by the tank manufacturer. The system shall be designed to protect both the tank and the foundation rebar in concrete floors.

C. The cathodic protection system shall be tested both at the completion of construction and at the 1-year anniversary inspection by the manufacturer's authorized dealer.

2.17 PLASTIC ENCAPSULATED CAP

A. High density UV resistant polyethylene co-polymer caps and sealant shall be used to cover the bolts, nuts and washers exposed on the exterior sidewall of the tank.

2.18 LIGHTNING PROTECTION SYSTEM

A. Provide a “Faraday Cage” multi-point type lightning protection system designed specifically for the project tank, consisting of aluminum masts, air terminals, conductors, ground rods and associated connectors and accessories necessary for a complete tank protection system.

B. The lightning protection system shall be designed by a licensed professional engineer employed by the tank manufacturer.

PART 3 EXECUTION

3.01 GENERAL

A. Install the tank and all associated accessories in accordance with the written instructions provided by the tank manufacturer.

B. Attend pre-installation meeting as required/scheduled by the Owner's Representative.

C. Employees of the authorized tank provider/erector shall be experienced in the construction of the specified tank and trained in a factory training program receiving builder certification by the tank manufacturer, and shall be employed full time by the authorized dealer

D. Field fabrication of structural components or panels will not be accepted. Forcing of the structure to achieve fit-up during construction is not acceptable.

E. All tank accessories shall be installed plumb and level, free from distortion and defects. All components shall be assembled with fittings to accommodate tight and secure joints.

F. Install tank appurtenances vertical and plumb.

G. Protect finished work from damage until project is accepted by the Owner.

H. Any dissimilar metals that are to be in contact with each other shall be installed with a dielectric sleeve, fitting, isolating strip, etc.

3.02 CONCRETE TANK FOUNDATION

A. The tank foundation on piles shall be built in accordance with the contract drawings and/or approved shop drawings.

B. See Section 033000 - Cast-in-Place Concrete and Section 316333 - Drilled Micropiles.

3.03 TANK STRUCTURE

A. Field erection of the glass-coated, bolted-steel structures and components shall be in accordance with the procedures established by the manufacturer and performed by an authorized dealer only of the tank manufacturer regularly engaged in erection of these tanks, using experienced factory-trained certified erectors fully employed by the authorized dealer.

B. Only specialized erection jacks and building equipment developed and supplied by the tank manufacturer shall be used to erect the tanks.

C. Particular care shall be taken in handling and bolting of the glass-coated steel tank panels, appurtenances and members to avoid abrasion of the coating system. Prior to liquid test, all surface areas shall be visually inspected. Chips or scrapes in the glass coating shall be repaired in accordance with the tank manufacturer's recommended procedure.

D. Holiday testing shall be performed during erection using a wet sponge nine-volt leak detection device. All holidays found shall be repaired in accordance with manufacturers published touch-up procedures.

E. Where aluminum tank roof materials come in contact with dissimilar metals, an insulating paint or tape shall be applied between the aluminum and the dissimilar metal.

3.04 HANDRAILS AND PLATFORMS

A. Posts shall be installed plumb and rails shall be installed level. All components shall be accurately fitted, free from distortion and defects.

B. Clean and strip aluminum where site welding is required.

C. Supply items required to be embedded in concrete or placed in partitions with setting templates, for each appropriate section.

D. Anchor railings with mounting brackets supplied by the manufacturer.

E. Assemble with spigots and sleeves to accommodate tight joints where shown on the drawings.

F. Remove plastic wrap from pipe after installation.

G. The maximum variation from plumb shall be one quarter (1/4) inch, non-cumulative.

H. The maximum offset from true alignment shall be one quarter (1/4) inch.

3.05 TANK ACCESS LADDERS

A. Install items plumb and level, accurately fitted, free from distortion or defects.

B. Provide anchors, plates, angles, hangers, and struts required for connecting ladder to structure.

C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

D. Field weld components indicated on approved shop drawings. Perform field welding in accordance with AWS D1.1. Provide a fire watch during all welding operations.

E. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws whenever possible. Where not concealed, use flush countersunk fastenings.

F. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.

G. Obtain Engineer and tank fabricator approval prior to site cutting or making adjustments not scheduled.

H. Install safety climbing system in accordance with manufacturer's instructions.

I. Maximum Variation From Plumb: 1/4 inch in 10 feet, non-cumulative.

J. Maximum Offset From True Alignment: 1/4 inch.

K. Demonstrate operation and use of safety climbing system to Owner's representatives once system is installed

3.06 FIELD TESTING

A. Following completion of erection and cleaning of the tank, the structure shall be tested for liquid tightness by filling to its overflow elevation.

B. Any leaks discovered by this test shall be corrected by the contractor in accordance with the manufacturer's recommendations.

C. Water required for the first test will be furnished by the Owner following completion of tank erection. The cost to furnish water for additional tests shall be paid for by the Contractor. Labor and equipment necessary for hydrostatic tank testing shall be included in the bid price of the tank.

D. Contractor shall be responsible for disposal of water in accordance with Owner requirements and applicable codes.

3.07 PROTECTION

A. Provide barricades and other forms of protection to protect Owner's personnel and general public from injury due to tank erection.

B. Provide temporary fencing to secure the entire work and staging areas. The temporary fencing shall be 6 foot high chain link fence with lockable entry. Duplicate keys shall be provided to the Owner and their representative to allow continuing access to the site.

C. Provide interior and exterior shoring, bracing and support to prevent premature collapse of tank structure or element to be erected, as deemed required by the manufacturer.

D. Protect from damage existing finish work that is to remain in place.

3.08 QUALITY CONTROL

A. On or near the one (1) year anniversary date of the Owner assuming ownership of tank, the manufacturer's authorized representative shall make a visual inspection of the tank interior coating and appurtenances, tank exterior coating and appurtenances, and the immediate area surrounding the tank for evidence of leakage or other deficiency. A written summary of the inspection report will be filed with the tank owner and the tank manufacturer.

B. Water required for the inspection process will be furnished and disposed of by the Owner.

3.09 WARRANTY

A. Provide the Owner with a written warranty from the Contractor against any water leakage for the first twenty (20) years from any roof, wall, or floor surface. Should any leakage occur within the first twenty (20) years, the Contractor/tank manufacturer shall provide the necessary labor and materials to repair said leak.

END OF SECTION

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PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Pipe penetration seals.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Thunderline Corp

B. PSI Products

C. Approved equal

2.02 MATERIALS

A. Seals shall be modular mechanical type, consisting of interlocking synthetic rubber links shaped to continuously fill the annular space between the pipe and wall opening. Links shall be loosely assembled with bolts to form a continuous rubber belt around the pipe with a pressure plate under each bolt head and nut.

B. After the seal assembly is positioned in the sleeve, tightening of the bolts shall cause the rubber sealing elements to expand and provide a watertight seal between the pipe and wall opening under 40 feet of head. Seal shall be suitable for a temperature range of -40°F to 250°F and submergence in groundwater.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Determine the required inside diameter of each individual wall opening or sleeve. The inside diameter of each wall opening shall be sized as recommended by the manufacturer to fit the pipe and pipe penetration seal to assure a watertight joint. Sizing for correct pipe penetration seal model and number of links per seal may be obtained through manufacturer's catalog. If pipe outer diameter is nonstandard due to coating or insulation, consult manufacturer for engineering assistance and recommendation before proceeding with wall opening detail.

3.02 INSTALLATION

A. Install and tighten seal to provide a watertight pipe penetration in accordance with manufacturer's instructions.

END OF SECTION

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SOIL AND PAINT SAMPLING DATA

(FOR INFORMATION ONLY – NOT PART OF S3C0607-13G CONTRACT DOCUMENTS)

APPENDIX PROTECTED WATER STORAGE TANK EXTERIOR PAINT SAMPLES AND SOIL SAMPLES AROUND TANK PERIMETER

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Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

May 26, 2022

Andrew Manfredi
H2M Group
538 Melville Rd.
Melville, NY 11747

RE: Project: NCDP2202
Pace Project No.: 70210809

Dear Andrew Manfredi:

Enclosed are the analytical results for sample(s) received by the laboratory on April 13, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Melville

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sophia Sparkes

Sophia Sparkes
sophia.sparkes@pacelabs.com
(631)694-3040
Project Manager

Enclosures

cc: Joseph Minero, H2M Group

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

CERTIFICATIONS

Project: NCDP2202
Pace Project No.: 70210809

Pace Analytical Services Long Island
575 Broad Hollow Rd, Melville, NY 11747
Connecticut Certification #: PH-0435
Delaware Certification # NY 10478
Maryland Certification #: 208
Massachusetts Certification #: M-NY026
New Hampshire Certification #: 2987
New Jersey Certification #: NY158
New York Certification #: 10478 Primary Accrediting Body
Pennsylvania Certification #: 68-00350
Rhode Island Certification #: LAO00340
Virginia Certification # 460302

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP2202
Pace Project No.: 70210809

Sample: SAMPLE#1-EXTERIOR PAINT SAMPLE **Lab ID: 70210809001** Collected: 04/12/22 11:00 Received: 04/13/22 13:41 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3050B Pace Analytical Services - Melville							
Arsenic	**<19.5**	mg/kg	19.5	10	05/24/22 07:30	05/25/22 17:11	7440-38-2	
Barium	**82.7**	mg/kg	38.9	1	05/24/22 07:30	05/25/22 11:50	7440-39-3	
Cadmium	**0.67**	mg/kg	0.49	1	05/24/22 07:30	05/25/22 11:50	7440-43-9	
Chromium	**1360**	mg/kg	1.9	1	05/24/22 07:30	05/25/22 11:50	7440-47-3	
Lead	**98200**	mg/kg	48.6	50	05/24/22 07:30	05/26/22 14:21	7439-92-1	
Selenium	**3.3**	mg/kg	1.9	1	05/24/22 07:30	05/25/22 11:50	7782-49-2	
Silver	**2.5**	mg/kg	1.9	1	05/24/22 07:30	05/25/22 11:50	7440-22-4	
6010 MET ICP, TCLP	Analytical Method: EPA 6010C Preparation Method: EPA 3005A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Arsenic	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:55	7440-38-2	
Barium	**<1.0**	mg/L	1.0	1	04/19/22 13:50	04/20/22 11:55	7440-39-3	
Chromium	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:55	7440-47-3	
Lead	**<0.025**	mg/L	0.025	1	04/19/22 13:50	04/20/22 11:55	7439-92-1	
Selenium	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:55	7782-49-2	
Silver	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:55	7440-22-4	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Mercury	**<0.00020**	mg/L	0.00020	1	04/21/22 10:21	04/21/22 17:01	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Melville							
Mercury	**0.034**	mg/kg	0.034	1	05/23/22 16:15	05/24/22 12:32	7439-97-6	D6,H1, H2,M1

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP2202
Pace Project No.: 70210809

Sample: SAMPLE#2-INTERIOR PAINT SAMPLE **Lab ID: 70210809002** Collected: 04/12/22 11:00 Received: 04/13/22 13:41 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3050B Pace Analytical Services - Melville							
Arsenic	**46.7**	mg/kg	4.2	5	05/24/22 07:30	05/25/22 11:52	7440-38-2	
Barium	**<84.9**	mg/kg	84.9	5	05/24/22 07:30	05/25/22 11:52	7440-39-3	
Cadmium	**8.5**	mg/kg	1.1	5	05/24/22 07:30	05/25/22 11:52	7440-43-9	
Chromium	**218**	mg/kg	4.2	5	05/24/22 07:30	05/25/22 11:52	7440-47-3	M1
Lead	**26.8**	mg/kg	2.1	5	05/24/22 07:30	05/25/22 11:52	7439-92-1	D6,M1
Selenium	**<4.2**	mg/kg	4.2	5	05/24/22 07:30	05/25/22 11:52	7782-49-2	
Silver	**<4.2**	mg/kg	4.2	5	05/24/22 07:30	05/25/22 11:52	7440-22-4	M1
6010 MET ICP, TCLP	Analytical Method: EPA 6010C Preparation Method: EPA 3005A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Arsenic	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:57	7440-38-2	
Barium	**<1.0**	mg/L	1.0	1	04/19/22 13:50	04/20/22 11:57	7440-39-3	
Chromium	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:57	7440-47-3	
Lead	**0.043**	mg/L	0.025	1	04/19/22 13:50	04/20/22 11:57	7439-92-1	
Selenium	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:57	7782-49-2	
Silver	**<0.050**	mg/L	0.050	1	04/19/22 13:50	04/20/22 11:57	7440-22-4	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Mercury	**<0.00020**	mg/L	0.00020	1	04/21/22 10:21	04/21/22 17:02	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Melville							
Mercury	**<0.033**	mg/kg	0.033	1	05/23/22 16:15	05/24/22 12:36	7439-97-6	H1,H2

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP2202
Pace Project No.: 70210809

Sample: SAMPLE #3-SOIL SAMPLE SP1 **Lab ID: 70210809003** Collected: 04/12/22 11:00 Received: 04/13/22 13:41 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, TCLP	Analytical Method: EPA 6010C Preparation Method: EPA 3005A Leachate Method/Date: EPA 1311; 05/20/22 20:15 Pace Analytical Services - Melville							
Arsenic	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:12	7440-38-2	
Barium	**<1.0**	mg/L	1.0	1	05/24/22 07:35	05/24/22 12:12	7440-39-3	
Cadmium	**<0.012**	mg/L	0.012	1	05/24/22 07:35	05/24/22 12:12	7440-43-9	
Chromium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:12	7440-47-3	
Lead	**0.038**	mg/L	0.025	1	05/24/22 07:35	05/24/22 12:12	7439-92-1	D6
Selenium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:12	7782-49-2	
Silver	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:12	7440-22-4	M1
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Mercury	**<0.00020**	mg/L	0.00020	1	04/21/22 10:21	04/21/22 17:04	7439-97-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP2202
Pace Project No.: 70210809

Sample: SAMPLE #4-SOIL SAMPLE SP2 **Lab ID: 70210809004** Collected: 04/12/22 11:00 Received: 04/13/22 13:41 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, TCLP	Analytical Method: EPA 6010C Preparation Method: EPA 3005A Leachate Method/Date: EPA 1311; 05/20/22 20:15 Pace Analytical Services - Melville							
Arsenic	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:34	7440-38-2	
Barium	**<1.0**	mg/L	1.0	1	05/24/22 07:35	05/24/22 12:34	7440-39-3	
Cadmium	**<0.012**	mg/L	0.012	1	05/24/22 07:35	05/24/22 12:34	7440-43-9	
Chromium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:34	7440-47-3	
Lead	**0.030**	mg/L	0.025	1	05/24/22 07:35	05/24/22 12:34	7439-92-1	
Selenium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:34	7782-49-2	
Silver	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:34	7440-22-4	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Mercury	**<0.00020**	mg/L	0.00020	1	04/21/22 10:21	04/21/22 17:05	7439-97-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP2202
Pace Project No.: 70210809

Sample: SAMPLE #5-SOIL SAMPLE SP3 **Lab ID: 70210809005** Collected: 04/12/22 11:00 Received: 04/13/22 13:41 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, TCLP	Analytical Method: EPA 6010C Preparation Method: EPA 3005A Leachate Method/Date: EPA 1311; 05/20/22 20:15 Pace Analytical Services - Melville							
Arsenic	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:37	7440-38-2	
Barium	**<1.0**	mg/L	1.0	1	05/24/22 07:35	05/24/22 12:37	7440-39-3	
Cadmium	**<0.012**	mg/L	0.012	1	05/24/22 07:35	05/24/22 12:37	7440-43-9	
Chromium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:37	7440-47-3	
Lead	**0.026**	mg/L	0.025	1	05/24/22 07:35	05/24/22 12:37	7439-92-1	
Selenium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:37	7782-49-2	
Silver	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:37	7440-22-4	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Mercury	**<0.00020**	mg/L	0.00020	1	04/21/22 10:21	04/21/22 17:07	7439-97-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP2202
Pace Project No.: 70210809

Sample: SAMPLE #6-SOIL SAMPLE SP4 **Lab ID: 70210809006** Collected: 04/12/22 11:00 Received: 04/13/22 13:41 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, TCLP	Analytical Method: EPA 6010C Preparation Method: EPA 3005A Leachate Method/Date: EPA 1311; 05/20/22 20:15 Pace Analytical Services - Melville							
Arsenic	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:39	7440-38-2	
Barium	**<1.0**	mg/L	1.0	1	05/24/22 07:35	05/24/22 12:39	7440-39-3	
Cadmium	**<0.012**	mg/L	0.012	1	05/24/22 07:35	05/24/22 12:39	7440-43-9	
Chromium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:39	7440-47-3	
Lead	**<0.025**	mg/L	0.025	1	05/24/22 07:35	05/24/22 12:39	7439-92-1	
Selenium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:39	7782-49-2	
Silver	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:39	7440-22-4	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Mercury	**<0.00020**	mg/L	0.00020	1	04/21/22 10:21	04/21/22 17:08	7439-97-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP2202
Pace Project No.: 70210809

Sample: SAMPLE #7-SOIL SAMPLE SP4 **Lab ID: 70210809007** Collected: 04/12/22 11:00 Received: 04/13/22 13:41 Matrix: Solid

Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP, TCLP	Analytical Method: EPA 6010C Preparation Method: EPA 3005A Leachate Method/Date: EPA 1311; 05/20/22 20:15 Pace Analytical Services - Melville							
Arsenic	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:41	7440-38-2	
Barium	**<1.0**	mg/L	1.0	1	05/24/22 07:35	05/24/22 12:41	7440-39-3	
Cadmium	**<0.012**	mg/L	0.012	1	05/24/22 07:35	05/24/22 12:41	7440-43-9	
Chromium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:41	7440-47-3	
Lead	**0.035**	mg/L	0.025	1	05/24/22 07:35	05/24/22 12:41	7439-92-1	
Selenium	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:41	7782-49-2	
Silver	**<0.050**	mg/L	0.050	1	05/24/22 07:35	05/24/22 12:41	7440-22-4	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 04/14/22 19:39 Pace Analytical Services - Melville							
Mercury	**<0.00020**	mg/L	0.00020	1	04/21/22 10:21	04/21/22 17:10	7439-97-6	

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

QC Batch: 253243 — Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A — Analysis Description: 7470 Mercury TCLP
Laboratory: Pace Analytical Services - Melville
Associated Lab Samples: 70210809001, 70210809002, 70210809003, 70210809004, 70210809005, 70210809006, 70210809007

METHOD BLANK: 1279525 — Matrix: Water
Associated Lab Samples: 70210809001, 70210809002, 70210809003, 70210809004, 70210809005, 70210809006, 70210809007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00020	0.00020	04/21/22 16:43	

METHOD BLANK: 1275182 — Matrix: Water
Associated Lab Samples: 70210809001, 70210809002, 70210809003, 70210809004, 70210809005, 70210809006, 70210809007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00020	0.00020	04/21/22 16:46	

METHOD BLANK: 1276093 — Matrix: Water
Associated Lab Samples: 70210809001, 70210809002, 70210809003, 70210809004, 70210809005, 70210809006, 70210809007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00020	0.00020	04/21/22 16:47	

LABORATORY CONTROL SAMPLE: 1279526

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	0.001	0.0010	102	80-120	

MATRIX SPIKE SAMPLE: 1279527

Parameter	Units	70210891003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	<0.00020	0.001	0.0010	101	75-125	

SAMPLE DUPLICATE: 1279528

Parameter	Units	70210891003 Result	Dup Result	RPD	Qualifiers
Mercury	mg/L	<0.00020	<0.00020		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

QC Batch: 257828
QC Batch Method: EPA 7471B
Analysis Method: EPA 7471B
Analysis Description: 7471 Mercury
Laboratory: Pace Analytical Services - Melville
Associated Lab Samples: 70210809001, 70210809002

METHOD BLANK: 1301889 Matrix: Solid
Associated Lab Samples: 70210809001, 70210809002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	<0.038	0.038	05/24/22 12:29	

LABORATORY CONTROL SAMPLE: 1301890

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.19	0.23	120	80-120	

MATRIX SPIKE SAMPLE: 1301891

Parameter	Units	70210809001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.034	0.2	0.31	141	80-120	H1,M1

SAMPLE DUPLICATE: 1301892

Parameter	Units	70210809001 Result	Dup Result	RPD	Qualifiers
Mercury	mg/kg	0.034	0.093	92	D6,H1

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

QC Batch: 257872
QC Batch Method: EPA 3050B
Analysis Method: EPA 6010C
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Melville
Associated Lab Samples: 70210809001, 70210809002

METHOD BLANK: 1302322 Matrix: Solid
Associated Lab Samples: 70210809001, 70210809002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	<0.50	0.50	05/25/22 11:40	
Barium	mg/kg	<10	10	05/25/22 11:40	
Cadmium	mg/kg	<0.12	0.12	05/25/22 11:40	
Chromium	mg/kg	<0.50	0.50	05/25/22 11:40	
Lead	mg/kg	<0.25	0.25	05/25/22 11:40	
Selenium	mg/kg	<0.50	0.50	05/25/22 11:40	
Silver	mg/kg	<0.50	0.50	05/25/22 11:40	

LABORATORY CONTROL SAMPLE: 1302323

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	108	92.3	85	75-106	
Barium	mg/kg	361	342	95	77-110	
Cadmium	mg/kg	48.3	45.5	94	75-106	
Chromium	mg/kg	172	155	90	76-110	
Lead	mg/kg	100	101	100	81-115	
Selenium	mg/kg	103	94.7	92	71-110	
Silver	mg/kg	29.7	28.2	95	75-113	

MATRIX SPIKE SAMPLE: 1302433

Parameter	Units	70210809002 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	46.7	45.2	87.3	90	75-125	
Barium	mg/kg	<84.9	45.2	<90.4	123	75-125	
Cadmium	mg/kg	8.5	45.2	60.6	115	75-125	
Chromium	mg/kg	218	45.2	295	169	75-125	M1
Lead	mg/kg	26.8	45.2	122	210	75-125	M1
Selenium	mg/kg	<4.2	45.2	46.6	103	75-125	
Silver	mg/kg	<4.2	22.6	7.9	35	75-125	M1

SAMPLE DUPLICATE: 1302432

Parameter	Units	70210809002 Result	Dup Result	RPD	Qualifiers
Arsenic	mg/kg	46.7	45.9	2	
Barium	mg/kg	<84.9	<91.7		
Cadmium	mg/kg	8.5	8.1	4	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

SAMPLE DUPLICATE: 1302432

Parameter	Units	70210809002 Result	Dup Result	RPD	Qualifiers
Chromium	mg/kg	218	229	5	
Lead	mg/kg	26.8	44.8	50	D6
Selenium	mg/kg	<4.2	<4.6		
Silver	mg/kg	<4.2	<4.6		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

QC Batch: 252811
QC Batch Method: EPA 3005A
Analysis Method: EPA 6010C
Analysis Description: 6010 MET TCLP
Laboratory: Pace Analytical Services - Melville
Associated Lab Samples: 70210809001, 70210809002

METHOD BLANK: 1277486 Matrix: Water
Associated Lab Samples: 70210809001, 70210809002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.010	0.010	04/20/22 11:11	
Barium	mg/L	<0.20	0.20	04/20/22 11:11	
Chromium	mg/L	<0.010	0.010	04/20/22 11:11	
Lead	mg/L	<0.0050	0.0050	04/20/22 11:11	
Selenium	mg/L	<0.010	0.010	04/20/22 11:11	
Silver	mg/L	<0.010	0.010	04/20/22 11:11	

METHOD BLANK: 1275182 Matrix: Water
Associated Lab Samples: 70210809001, 70210809002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.050	0.050	04/20/22 11:16	
Barium	mg/L	<1.0	1.0	04/20/22 11:16	
Chromium	mg/L	<0.050	0.050	04/20/22 11:16	
Lead	mg/L	<0.025	0.025	04/20/22 11:16	
Selenium	mg/L	<0.050	0.050	04/20/22 11:16	
Silver	mg/L	<0.050	0.050	04/20/22 11:16	

LABORATORY CONTROL SAMPLE: 1277487

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	0.5	0.47	94	80-120	
Barium	mg/L	0.5	0.49	98	80-120	
Chromium	mg/L	0.5	0.48	96	80-120	
Lead	mg/L	0.5	0.49	99	80-120	
Selenium	mg/L	0.5	0.47	95	80-120	
Silver	mg/L	0.25	0.24	98	80-120	

MATRIX SPIKE SAMPLE: 1277489

Parameter	Units	70210959001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	<0.050	0.5	0.52	104	75-125	
Barium	mg/L	0.19J	0.5	<1.0	102	75-125	
Chromium	mg/L	0.012J	0.5	0.52	101	75-125	
Lead	mg/L	0.30	0.5	0.80	101	75-125	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

MATRIX SPIKE SAMPLE: 1277489

Parameter	Units	70210959001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Selenium	mg/L	<0.050	0.5	0.54	103	75-125	
Silver	mg/L	<0.050	0.25	0.19	74	75-125	M1

SAMPLE DUPLICATE: 1277488

Parameter	Units	70210959001 Result	Dup Result	RPD	Qualifiers
Arsenic	mg/L	<0.050	<0.050		
Barium	mg/L	0.19J	<1.0		
Chromium	mg/L	0.012J	<0.050		
Lead	mg/L	0.30	0.29	2	
Selenium	mg/L	<0.050	<0.050		
Silver	mg/L	<0.050	<0.050		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

QC Batch: 257871 — Analysis Method: EPA 6010C
QC Batch Method: EPA 3005A — Analysis Description: 6010 MET TCLP
Laboratory: Pace Analytical Services - Melville
Associated Lab Samples: 70210809003, 70210809004, 70210809005, 70210809006, 70210809007

METHOD BLANK: 1302318 — Matrix: Water
Associated Lab Samples: 70210809003, 70210809004, 70210809005, 70210809006, 70210809007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.010	0.010	05/24/22 12:05	
Barium	mg/L	<0.20	0.20	05/24/22 12:05	
Cadmium	mg/L	<0.0025	0.0025	05/24/22 12:05	
Chromium	mg/L	0.012	0.010	05/24/22 12:05	
Lead	mg/L	<0.0050	0.0050	05/24/22 12:05	
Selenium	mg/L	<0.010	0.010	05/24/22 12:05	
Silver	mg/L	<0.010	0.010	05/24/22 12:05	

METHOD BLANK: 1276093 — Matrix: Water
Associated Lab Samples: 70210809003, 70210809004, 70210809005, 70210809006, 70210809007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.050	0.050	05/24/22 12:10	
Barium	mg/L	<1.0	1.0	05/24/22 12:10	
Cadmium	mg/L	<0.012	0.012	05/24/22 12:10	
Chromium	mg/L	<0.050	0.050	05/24/22 12:10	
Lead	mg/L	<0.025	0.025	05/24/22 12:10	
Selenium	mg/L	<0.050	0.050	05/24/22 12:10	
Silver	mg/L	<0.050	0.050	05/24/22 12:10	

LABORATORY CONTROL SAMPLE: 1302319

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	0.5	0.51	102	80-120	
Barium	mg/L	0.5	0.52	104	80-120	
Cadmium	mg/L	0.5	0.52	104	80-120	
Chromium	mg/L	0.5	0.49	98	80-120	
Lead	mg/L	0.5	0.52	104	80-120	
Selenium	mg/L	0.5	0.52	103	80-120	
Silver	mg/L	0.25	0.26	104	80-120	

MATRIX SPIKE SAMPLE: 1302321

Parameter	Units	70210809003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	<0.050	0.5	0.44	85	75-125	

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP2202
Pace Project No.: 70210809

MATRIX SPIKE SAMPLE: 1302321

Parameter	Units	70210809003 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Barium	mg/L	<1.0	0.5	<1.0	85	75-125	
Cadmium	mg/L	<0.012	0.5	0.43	85	75-125	
Chromium	mg/L	<0.050	0.5	0.41	81	75-125	
Lead	mg/L	0.038	0.5	0.48	88	75-125	
Selenium	mg/L	<0.050	0.5	0.40	80	75-125	
Silver	mg/L	<0.050	0.25	0.067	26	75-125	M1

SAMPLE DUPLICATE: 1302320

Parameter	Units	70210809003 Result	Dup Result	RPD	Qualifiers
Arsenic	mg/L	<0.050	<0.050		
Barium	mg/L	<1.0	<1.0		
Cadmium	mg/L	<0.012	<0.012		
Chromium	mg/L	<0.050	<0.050		
Lead	mg/L	0.038	0.054	33	D6
Selenium	mg/L	<0.050	<0.050		
Silver	mg/L	<0.050	<0.050		

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REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALIFIERS

Project: NCDP2202
Pace Project No.: 70210809

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
H1	Analysis conducted outside the EPA method holding time.
H2	Extraction or preparation conducted outside EPA method holding time.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: NCDP2202
Pace Project No.: 70210809

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
70210809001	**SAMPLE#1-EXTERIOR PAINT SAMPLE**	EPA 3050B	257872	EPA 6010C	257913
70210809002	**SAMPLE#2-INTERIOR PAINT SAMPLE**	EPA 3050B	257872	EPA 6010C	257913
70210809001	**SAMPLE#1-EXTERIOR PAINT SAMPLE**	EPA 3005A	252811	EPA 6010C	252922
70210809002	**SAMPLE#2-INTERIOR PAINT SAMPLE**	EPA 3005A	252811	EPA 6010C	252922
70210809003	**SAMPLE #3-SOIL SAMPLE SP1**	EPA 3005A	257871	EPA 6010C	257909
70210809004	**SAMPLE #4-SOIL SAMPLE SP2**	EPA 3005A	257871	EPA 6010C	257909
70210809005	**SAMPLE #5-SOIL SAMPLE SP3**	EPA 3005A	257871	EPA 6010C	257909
70210809006	**SAMPLE #6-SOIL SAMPLE SP4**	EPA 3005A	257871	EPA 6010C	257909
70210809007	**SAMPLE #7-SOIL SAMPLE SP4**	EPA 3005A	257871	EPA 6010C	257909
70210809001	**SAMPLE#1-EXTERIOR PAINT SAMPLE**	EPA 7470A	253243	EPA 7470A	253342
70210809002	**SAMPLE#2-INTERIOR PAINT SAMPLE**	EPA 7470A	253243	EPA 7470A	253342
70210809003	**SAMPLE #3-SOIL SAMPLE SP1**	EPA 7470A	253243	EPA 7470A	253342
70210809004	**SAMPLE #4-SOIL SAMPLE SP2**	EPA 7470A	253243	EPA 7470A	253342
70210809005	**SAMPLE #5-SOIL SAMPLE SP3**	EPA 7470A	253243	EPA 7470A	253342
70210809006	**SAMPLE #6-SOIL SAMPLE SP4**	EPA 7470A	253243	EPA 7470A	253342
70210809007	**SAMPLE #7-SOIL SAMPLE SP4**	EPA 7470A	253243	EPA 7470A	253342
70210809001	**SAMPLE#1-EXTERIOR PAINT SAMPLE**	EPA 7471B	257828	EPA 7471B	257847
70210809002	**SAMPLE#2-INTERIOR PAINT SAMPLE**	EPA 7471B	257828	EPA 7471B	257847

CHAIN-OF-CUSTODY Analytical Request Document

Pace Analytical

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf
Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Work

WO# : 70210809

70210809

ALL BOLD OUT

Container Preservative Ty

Company: H2M architects & Engineers	Billing Information: H2M architects & engineers
Address: S38 Broadhollow Road, Melvile NY 11747	
Report To: Andrew Manfredi	Email To: amanfredi@h2m.com
Copy To: Joe Minero jminero@h2m.com	Site Collection Info/Address: Seaford, NY
Customer Project Name/Number: NCDP2202	State: NY / County/City: Nassau / Time Zone Collected: [ ]PT [ ]MT [ ]CT [X]ET

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Phone: 631-756-8000 Email: amanfredi@h2m.com	Site/Facility ID #:	Compliance Monitoring? [ ] Yes [ ] No
Collected By (print): Joseph Minero	Purchase Order # : Quote #:	DW PWS ID #: DW Location Code:
Collected By (signature): JMinero	Turnaround Date Required:	Immediately Packed on Ice: [ ] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: _____ [ ] Hold: _____	Rush: (Expedite Charges Apply) [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] S Day	Field Filtered (if applicable): [ ] Yes [ ] No Analysis: _____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Container Type: Plastic (P) or Glass (G)	Arsenic	Barium	Chromium	Lead	Selenium	Silver	Mercury	TCLIP			
Sample #1 - Exterior Paint Sample	SL	G	4/12/2022	11am	4/12/2022	11am				X	X	X	X	X	X	X				
Sample #2 - Interior Paint Sample	SL	G	4/12/2022	11am	4/12/2022	11am				X	X	X	X	X	X	X				
Sample #3 - Soil Sample SP1																X				
Sample #4 - Soil Sample SP2																X				
Sample #S - Soil Sample SP3																X				
Sample #6 - Soil Sample SP4																X				
Sample #7 - Soil Sample SP4																X				

Analyses

Lab Profile/Line:

Lab Sample Receipt Checklist:
Custody Seals Present/Intact Y N NA
Custody Signatures Present Y N NA
Collector Signature Present Y N NA
Bottles Intact Y N NA
Correct Bottles Y N NA
Sufficient Volume Y N NA
Samples Received on Ice Y N NA
VOA - Headspace Acceptable Y N NA
USDA Regulated Soils Y N NA
Samples in Holding Time Y N NA
Residual Chlorine Present Y N NA
Cl Strips: _____
Sample pH Acceptable Y N NA
pH Strips: _____
Sulfide Present Y N NA
Lead Acetate Strips: _____

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<S00 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #:

Samples received via: FEDEX UPS Client Courier Pace Courier

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: TH091
Cooler 1 Temp Upon Receipt: 23 oC
Cooler 1 Therm Corr. Factor: 0.1 oC
Cooler 1 Corrected Temp: 23.1 oC
Comments:

Relinquished by/Company: (Signature) JMinero	Date/Time: 4/13/22 13:41	Received by/Company: (Signature) SaraRivinius	Date/Time: 4/13/22 1341
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: _____ of: _____

COC PAGE ___ of ___

Sample Container Count

WO# : 70210809

PM: STS **Due Date: 04/27/22**

CLIENT: H2MPC

Client: H2M Profile #: 7830

Work ID: NCDP2202 Notes: Line 1

☐ Use Point Number Spreadsheet

☐ Add SCLOGFD to first sample for Field Charge.

COC Line Item	Matrix	VG9U	VG9C	VG9H	VG9S	DG9T	DG9Y	DG9P	DG9A	DG6T	DG9S	AG4U	AG3U	AG2U	AG1U	AG34	AG3S	AG4E	AG3T	AG2R	AG1T	AG1H	AG1A	CG1U	BP4U	BP3U	BP2U	BP1U	BP3S	BP2S	BP4N	BP3N	BP2N	BP3C	BP3T	BP3S	BP3R	BP1Z	BP1N	BP1B	SP5T	R	WG2U	WGFU	WGKU	WGDU	ZPLC	GN	WP	IOC	SOC
1																																															1				
2																																															1				
3																																															1				
4																																															1				
5																																															1				
6																																															1				
7																																															1				
8																																															1				
9																																																				
10																																																				
11																																																				
12																																																				

Container Codes

Glass			
VG9U	40mL unpres clear vial	AG4U	125mL unpres amber glass
VG9C	40mL Ascorbic-HCl clear vial	AG3U	250mL unpres amber glass
VG9H	40mL HCl clear vial	AG2U	500mL unpres amber glass
VG9S	40mL Sulfuirc clear vial	AG1U	1liter unpres amber glass
DG9T	40mL Na Thiosulfate vial	AG34	Ammonium Cl 250mL bottle
DG9Y	40mL Citrate-Na Thiosulfate	AG3S	250mL H2SO4 amber glass
DG9P	40mL amber vial - TSP	AG4E	125mL EDA amber glass
DG9A	Ascorbic/Maleic Acid 40mL	AG3T	250mL Na Thio amber glass
DG6T	Na Thio 60mL Vial	AG2R	Na Sulfite 500mL (blue Cap)
DG9S	Ammonium Cl/CuSO4 40mL	AG1T	Na Thiosulfate 1L bottle
CG1U	1L Unpres Jar (Con Ed)	AG1H	1L HCl amber glass
		AG1A	(NH4Cl)
WG9O	8oz clear soil jar		
WG4O	4oz clear soil jar		

Plastic	
BP4U	125mL unpreserved plastic
BP3U	250mL unpreserved plastic
BP2U	500mL unpreserved plastic
BP1U	1L unpreserved plastic
BP4N	125mL HNO3 plastic
BP3N	250mL HNO3 plastic
BP2N	500mL HNO3 plastic
BP3S	250mL H2SO4 plastic
BP2S	500mL H2SO4 plastic
BP3C	NaOH 250mL bottle
BP3T	250mL Trizma
BP3S	250mL Ammonium Acetate
BP3R	250mL NH4SO4-NH4OH
BP1Z	1L NaOH, Zn Acelate
BP1N	1L HNO3 plastic
BP1B	Na Thiosulfate Amber Bottle

Misc.	
SP5T	120mL Coliform Na Thio
R	Terracore Kit
WG2U	2oz Unpreserved Jar
WGFU	4oz Unpreserved Jar
WGKU	8oz Unpreserved Jar
WGDU	16oz Unpreserved Jar
ZPLC	Ziplock Bag
TEDL	Tedlar Bag
BG1H	1L HCL Clear Glass
GN	General
WP	Wipe

IOC	
BP1U	1L unpreserved plastic
BP3N*	250mL HNO3 plastic
BP3C	250mL Sodium Hydroxide
AG2U	500mL unpres amber plass

* Can also be a BP4N

Matrix	
WT	Water
SL	Solid
NAL	Non-aqueous Liquid
OL	OIL
WP	Wipe
DW	Drinking Water

SOC		
DG9T	40mL Na Thio amber vial	2
DG9A	40mL Ascorbic acid vials	2
DG9Y	Citrate/Na Thiosulfate 40mL	2
DG6T	Na Thiosulfate 60mL vial	1
AG3U	250mL unpres amber glass	
AG3T	Na Thiosulfate 250mL bottle	
BP1B	Na Thiosulfate Amber bottle	
AG1T	Na Thiosultate 1L Amber	2
AG1A	(NH4CL)	2

717

Additional Comments

Dated: 09/08/2021

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

June 08, 2022

Andrew Manfredi
H2M Group
538 Melville Rd.
Melville, NY 11747

RE: Project: NCDP-2202
Pace Project No.: 70215945

Dear Andrew Manfredi:

Enclosed are the analytical results for sample(s) received by the laboratory on May 25, 2022. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Melville

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Sophia Sparkes

Sophia Sparkes
sophia.sparkes@pacelabs.com
(631)694-3040
Project Manager

Enclosures

cc: Joseph Minero, H2M Group

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

CERTIFICATIONS

Project: NCDP-2202
Pace Project No.: 70215945

Pace Analytical Services Long Island
575 Broad Hollow Rd, Melville, NY 11747
Connecticut Certification #: PH-0435
Delaware Certification # NY 10478
Maryland Certification #: 208
Massachusetts Certification #: M-NY026
New Hampshire Certification #: 2987
New Jersey Certification #: NY158
New York Certification #: 10478 Primary Accrediting Body
Pennsylvania Certification #: 68-00350
Rhode Island Certification #: LAO00340
Virginia Certification # 460302

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

ANALYTICAL RESULTS

Project: NCDP-2202
Pace Project No.: 70215945

Sample: EXTERIOR PAINT SAMPLE **Lab ID: 70215945001** Collected: 05/24/22 14:45 Received: 05/25/22 09:50 Matrix: Solid
Results reported on a "wet-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3050B Pace Analytical Services - Melville							
Arsenic	**10.1**	mg/kg	2.2	5	05/27/22 09:15	05/31/22 10:47	7440-38-2	
Barium	**85.0**	mg/kg	44.7	5	05/27/22 09:15	05/31/22 10:47	7440-39-3	
Cadmium	**<0.56**	mg/kg	0.56	5	05/27/22 09:15	05/31/22 10:47	7440-43-9	
Chromium	**2330**	mg/kg	2.2	5	05/27/22 09:15	05/31/22 10:47	7440-47-3	
Lead	**43800**	mg/kg	11.2	50	05/27/22 09:15	05/31/22 15:17	7439-92-1	
Selenium	**<2.2**	mg/kg	2.2	5	05/27/22 09:15	05/31/22 10:47	7782-49-2	
Silver	**3.2**	mg/kg	2.2	5	05/27/22 09:15	05/31/22 10:47	7440-22-4	
7471 Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B Pace Analytical Services - Melville							
Mercury	**<0.038**	mg/kg	0.038	1	06/01/22 15:49	06/02/22 11:52	7439-97-6	
Percent Moisture	Analytical Method: ASTM D2216-05M Pace Analytical Services - Melville							
Percent Moisture	**2.5**	%	0.10	1		06/06/22 13:22		

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP-2202
Pace Project No.: 70215945

QC Batch: 258973
QC Batch Method: EPA 7471B
Analysis Method: EPA 7471B
Analysis Description: 7471 Mercury
Laboratory: Pace Analytical Services - Melville
Associated Lab Samples: 70215945001

METHOD BLANK: 1306985 Matrix: Solid
Associated Lab Samples: 70215945001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/kg	<0.038	0.038	06/02/22 11:43	

LABORATORY CONTROL SAMPLE: 1306986

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.19	0.20	104	80-120	

MATRIX SPIKE SAMPLE: 1306987

Parameter	Units	70216008001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	0.28	2.6	1.9	62	80-120	M1

SAMPLE DUPLICATE: 1306988

Parameter	Units	70216008001 Result	Dup Result	RPD	Qualifiers
Mercury	mg/kg	0.28	0.22	26	D6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP-2202
Pace Project No.: 70215945

QC Batch: 258452
QC Batch Method: EPA 3050B
Analysis Method: EPA 6010C
Analysis Description: 6010 MET
Laboratory: Pace Analytical Services - Melville
Associated Lab Samples: 70215945001

METHOD BLANK: 1304874 Matrix: Solid
Associated Lab Samples: 70215945001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/kg	<0.48	0.48	05/31/22 10:16	
Barium	mg/kg	<9.6	9.6	05/31/22 10:16	
Cadmium	mg/kg	<0.12	0.12	05/31/22 10:16	
Chromium	mg/kg	<0.48	0.48	05/31/22 10:16	
Lead	mg/kg	<0.24	0.24	05/31/22 10:16	
Selenium	mg/kg	<0.48	0.48	05/31/22 10:16	
Silver	mg/kg	<0.48	0.48	05/31/22 10:16	

LABORATORY CONTROL SAMPLE: 1304875

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	86.9	75.8	87	75-106	
Barium	mg/kg	290	279	96	77-110	
Cadmium	mg/kg	38.8	36.4	94	75-106	
Chromium	mg/kg	138	132	95	76-110	
Lead	mg/kg	80.6	82.8	103	81-115	
Selenium	mg/kg	83	78.3	94	71-110	
Silver	mg/kg	23.8	23.2	97	75-113	

MATRIX SPIKE SAMPLE: 1304877

Parameter	Units	70216008001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/kg	1.4	29	22.3	72	75-125	M1
Barium	mg/kg	31.6	29	49.9	63	75-125	M1
Cadmium	mg/kg	0.60	29	23.5	79	75-125	
Chromium	mg/kg	8.7	29	30.2	74	75-125	M1
Lead	mg/kg	20.1	29	42.5	78	75-125	
Selenium	mg/kg	0.82	29	22.2	74	75-125	M1
Silver	mg/kg	0.21J	14.5	2.8	18	75-125	M1

SAMPLE DUPLICATE: 1304876

Parameter	Units	70216008001 Result	Dup Result	RPD	Qualifiers
Arsenic	mg/kg	1.4	1.3	2	
Barium	mg/kg	31.6	26.7	17	
Cadmium	mg/kg	0.60	0.67	12	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP-2202
Pace Project No.: 70215945

SAMPLE DUPLICATE: 1304876

Parameter	Units	70216008001 Result	Dup Result	RPD	Qualifiers
Chromium	mg/kg	8.7	8.3	5	
Lead	mg/kg	20.1	24.1	18	
Selenium	mg/kg	0.82	0.84	2	
Silver	mg/kg	0.21J	<0.65		

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA

Project: NCDP-2202
Pace Project No.: 70215945

QC Batch: 259476
QC Batch Method: ASTM D2216-05M
Analysis Method: ASTM D2216-05M
Analysis Description: Dry Weight/Percent Moisture
Laboratory: Pace Analytical Services - Melville

Associated Lab Samples: 70215945001

SAMPLE DUPLICATE: 1309847

Parameter	Units	70215945001 Result	Dup Result	RPD	Qualifiers
Percent Moisture	%	2.5	2.2	15	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALIFIERS

Project: NCDP-2202
Pace Project No.: 70215945

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

ANALYTE QUALIFIERS

D6	The precision between the sample and sample duplicate exceeded laboratory control limits.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

Pace Analytical Services, LLC
575 Broad Hollow Road
Melville, NY 11747
(631)694-3040

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: NCDP-2202
Pace Project No.: 70215945

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
70215945001	**EXTERIOR PAINT SAMPLE**	EPA 3050B	258452	EPA 6010C	258515
70215945001	**EXTERIOR PAINT SAMPLE**	EPA 7471B	258973	EPA 7471B	258993
70215945001	**EXTERIOR PAINT SAMPLE**	ASTM D2216-05M	259476		

Pace Analytical

CHAIN-OF-CUSTODY Analytical Request Document

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

WO#: 70215945

70215945

Pace Workorder Number or **LAB USE ONLY**

Company: H2M architects + engineers	Billing Information: H2M architects + engineers
Address: 538 Broadhollow Rd, 4th Floor East, Melville NY 11747	
Report To: Arthur Eschete	Email To: Aeschete@h2m.com
Copy To: Joe Minero; jminero@h2m.com	Site Collection Info/Address: 3340 Merrick Road
Customer Project Name/Number: NCDP2202	State: NY / County/City: Merrick / Time Zone Collected: [ ]PT [ ]MT [ ]CT [x]ET

Container Preservative Type **

Lab Project Manager: STS

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ______

Phone: 631-756-8000 Email: Aeschete@h2m.com	Site/Facility ID #:	Compliance Monitoring? [ ] Yes [ ] No
Collected By (print):	Purchase Order #: Quote #:	DW PWS ID #: DW Location Code:
Collected By (signature): Joe Avila	Turnaround Date Required:	Immediately Packed on Ice: [ ] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: ______ [ ] Hold: ______	Rush: (Expedite Charges Apply) [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day	Field Filtered (if applicable): [ ] Yes [ ] No Analysis: ______

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Analyses

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Container Type: Plastic (P) or Glass (G)	Arsenic, total metals	Barium, total metals	Cadmium, total metals	Chromium, total metals	Lead, total metals	Selenium, Total Metals	Silver, total metals	Mercury, total metals
Exterior Paint Sample	SL	G	5/24/22	2:45p						X	X	X	X	X	X	X	X

Lab Profile/Line:

Lab Sample Receipt Checklist:
- Custody Seals Present/Intact Y N NA (N circled)
- Custody Signatures Present Y N NA (Y circled)
- Collector Signature Present Y N NA (Y circled)
- Bottles Intact Y N NA (Y circled)
- Correct Bottles Y N NA (Y circled)
- Sufficient Volume Y N NA (Y circled)
- Samples Received on Ice Y N NA (NA circled)
- VOA - Headspace Acceptable Y N NA (NA circled)
- USDA Regulated Soils Y N NA (NA circled)
- Samples in Holding Time Y N NA (Y circled)
- Residual Chlorine Present Y N NA (NA circled)
- Cl Strips:
- Sample pH Acceptable Y N NA (NA circled)
- pH Strips: ______
- Sulfide Present Y N NA (NA circled)
- Lead Acetate Strips: ______

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry (circled) None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N (circled) N/A

Lab Tracking #:

Samples received via: FEDEX UPS Client (circled) Courier Pace Courier

LAB Sample Temperature Info:
- Temp Blank Received: Y N (circled) NA
- Therm ID#: THIO
- Cooler 1 Temp Upon Receipt: 23.6 oC
- Cooler 1 Therm Corr. Factor: -0.1 oC
- Cooler 1 Corrected Temp: 23.5 oC
- Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	MTJL LAB USE ONLY
[signature]	5-25-22 9:45AM	[signature]	5/25/22, 9:50am	Table #:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	Acctnum: Template: Prelogin:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:	PM: PB:

Trip Blank Received: Y N (circled) NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO (circled)

Page: ____ of: ____

COC PAGE ___ of ___

Sample Container Count

WO# : 70215945

PM: STS **Due Date: 06/09/22**

CLIENT: H2MPC

Client: H2MPC Profile # 7830

Work ID: NCDP2202 Notes

☐ Use Point Number Spreadsheet

☐ Add SCLOCFD to first sample for P

COC Line Item	Sample	VG9U	VG9C	VG9H	VG9S	DG9T	DG9Y	DG9P	DG9A	DG6T	DG9S	AG4U	AG3U	AG2U	AG1U	AG34	AG3S	AG4E	AG3T	AG2R	AG1T	AG1H	AG1A	CG1U	BP4U	BP3U	BP2U	BP1U	BP3S	BP2S	BP4N	BP3N	BP2N	BP3C	BP3T	BP3S	BP3R	BP1Z	BP1N	BP1B	SP5T	R	WG2U	WGFU	WGKU	WGDU	ZPLC	GN	WP	IOC	SOC
1																																																1				
2																																																					
3																																																					
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12																																																					

Container Codes

Glass				Plastic		Misc.	
VG9U	40mL unpres clear vial	AG4U	125mL unpres amber glass	BP4U	125mL unpreserved plastic	SP5T	120mL Coliform Na Thio
VG9C	40mL Ascorbic-HCl clear vial	AG3U	250mL unpres amber glass	BP3U	250mL unpreserved plastic	R	Terracore Kit
VG9H	40mL HCl clear vial	AG2U	500mL unpres amber glass	BP2U	500mL unpreserved plastic	WG2U	2oz Unpreserved Jar
VG9S	40mL Sulfuric clear vial	AG1U	1liter unpres amber glass	BP1U	1L unpreserved plastic	WGFU	4oz Unpreserved Jar
DG9T	40mL Na Thiosulfate vial	AG3A	Ammonium Cl 250mL bottle	BP4N	125mL HNO3 plastic	WGKU	8oz Unpreserved Jar
DG9Y	40mL Citrate-Na Thiosulfate	AG3S	250mL H2SO4 amber glass	BP3N	250mL HNO3 plastic	WGDU	16oz Unpreserved Jar
DG9P	40mL amber vial - TSP	AG4E	125mL EDA amber glass	BP2N	500mL HNO3 plastic	ZPLC	Ziplock Bag
DG9A	Ascorbic/Maleic Acid 40mL	AG3T	250mL Na Thio amber glass	BP3S	250mL H2SO4 plastic	TEDL	Tedlar Bag
DG6T	Na Thio 60mL Vial	AG2R	Na Sulfite 500mL (blue Cap)	BP2S	500mL H2SO4 plastic	BG1H	1L HCL Clear Glass
DG9S	Ammonium Cl/CuSO4 40mL	AG1T	Na Thiosulfate 1L bottle	BP3C	NaOH 250mL bottle	GN	General
CG1U	1L Unpres Jar (Con Ed)	AG1H	1L HCl amber glass	BP3T	250mL Trizma	WP	Wipe
		AG1A	(NH4Cl)	BP3S	250mL Ammonium Acetate		
WG9O	8oz clear soil jar			BP3R	250mL NH4SO4-NH4OH		
WG4O	4oz clear soil jar			BP1Z	1L NaOH, Zn Acetate		
				BP1N	1L HNO3 plastic		
				BP1B	Na Thiosulfate Amber Bottle		

IOC	
BP1U	1L unpreserved plastic
BP3N*	250mL HNO3 plastic
BP3C	250mL Sodium Hydroxide
AG2U	500mL unpres amber glass

* Can also be a BP4N

Matrix	
WT	Water
SL	Solid
NAL	Non-aqueous Liquid
OL	Oil
WP	Wipe
DW	Drinking Water

SDC		
DG9T	40mL Na Thio amber vial	2
DG9A	40mL Ascorbic acid vials	2
DG9Y	Citrate/Na Thiosulfate 40mL	2
DG6T	Na Thiosulfate 60mL vial	1
AG3U	250mL unpres amber glass	
AG3T	Na Thiosulfate 250mL bottle	
BP1B	Na Thiosulfate Amber bottle	
AG1T	Na Thiosulfate 1L Amber	2
AG1A	(NH4CL)	2

Additional Comments

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GEOTECHNICAL DATA

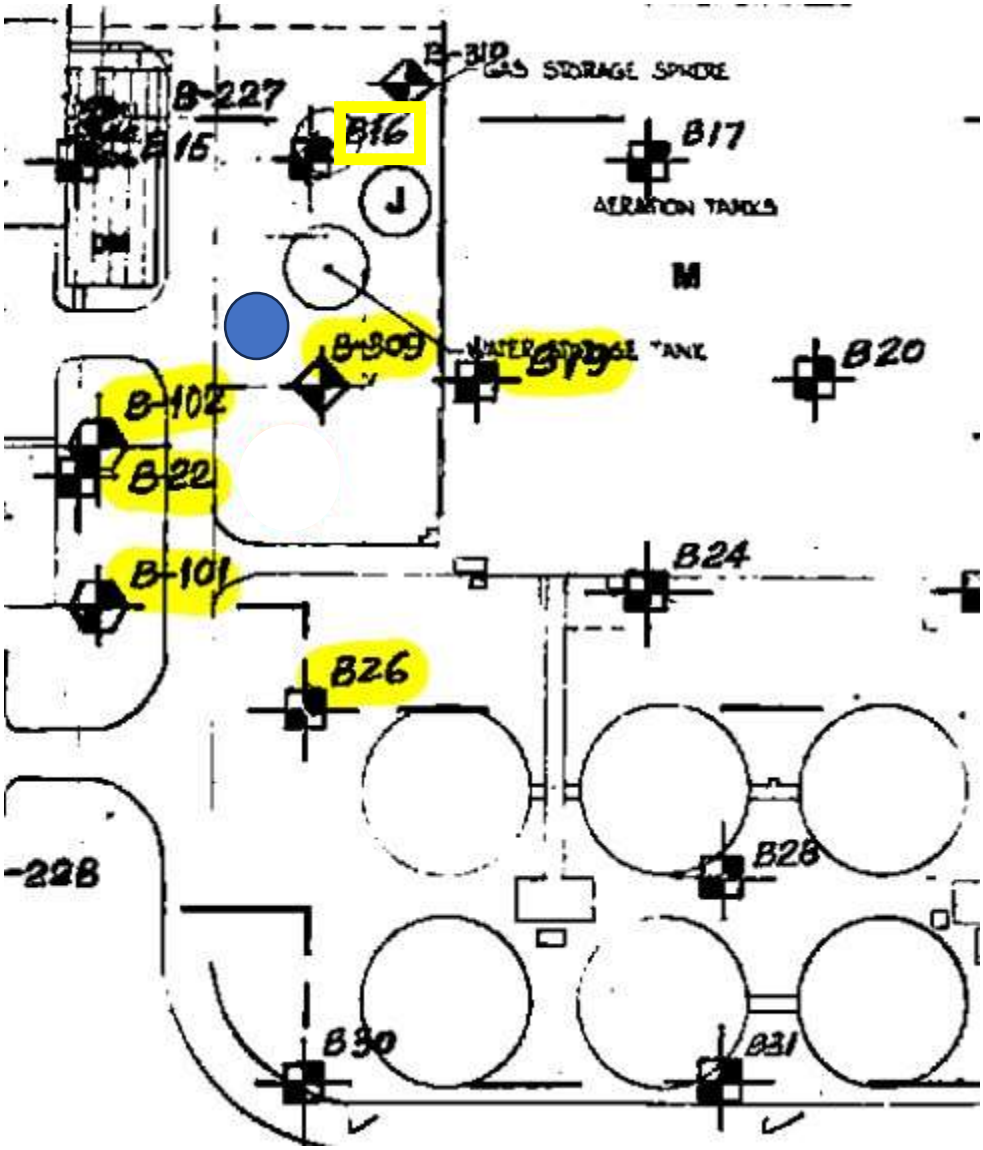
(FOR INFORMATION ONLY – NOT PART OF S3C0607-14G CONTRACT DOCUMENTS)

SOIL BORINGS FROM 1966, 1983 AND 1985, IN VICINITY OF PROTECTED WATER STORAGE TANK

SOIL MECHANICS DRILLING CORP. BORING REPORT AND DRAWING, AUGUST 22, 2023

+ + NO TEXT THIS PAGE + +

NASSAU COUNTY DPW CEDAR CREEK WPCP
SOIL BORINGS IN VICINITY OF PROTECTED WATER STORAGE TANK



Borings B16, B19, B22 and B26 made in 1966.

Borings B101 and B102 made in 1983.

Boring B309 made in 1985.

Reports follow.

Approximate location of proposed 250,000-gallon ground storage tank

W. M. WALSH COMPANY, INC.
North Bergen, New Jersey

Wantagh Water Plant — Nassau County, New York

TEST BORING DATA — TEST HOLE NO. B 16

Bridge — Rt. — Sec. — Sta. — Offset — Lr. Rt.

Borings made by: J. Sciamorelli — Inspector T. Mueller — Date Started 11/9/66 — Completed 11/9

MHW El. — MLW El. — El. of Ground Water Tidal — Length of Casing Driven

Ground Line Elevation 2.5

Depth in Feet	Blows Per Foot of Casing Penetration	Materials Encountered	Sample Number	Blows on Spoon 0/6	6/12	12/18
	2	Soft Meadow Mat & organic silt	1	1	2	2
	3					
	3	Very loose br. fine sand	2	1	1	1
	4	tr. silt & gravel				
	6					
5	4	Medium-Brown fine to med.	3	9	15	14
	15	sand. Tr. silt & gravel.				
	22					
	24					
	20					
10	9	Medium - Brown coarse	4	7	7	9
	12	sand some gravel.				
	15					
	15					
	17					
15	11		5	6	8	10
	15					
	19					
	20					
	23					
20	13		6	5	8	9
	17	Medium- Br. Med. sand				
	15					
	15					
	16					
25	15	Loose to Med- Brown	7	6	6	8
	19	Med. sand. tr. gravel				
	23					
	23					
	25					
30	19		8	5	5	7
	25					
	27					
	29	Medium-gray fine silty				
	31	sand				
35	16		9	6	9	9
	23					
	23					
	10-6"					
		stiff gr.silt &clay tr.sand	10	10	11	11
40						
45						
50						

Fill in with Black Drawing Ink

Inside Dia. of Casing	2½
" " " Spoon	1 3/8 "
Weight of Hammer on Casing	300 lbs.
" " " " Spoon	140 lbs.
Drop of Hammer on Casing	24 " 30"
" " " " Spoon	

DRY SAMPLE DATA

Sample No.	Elevation bottom of Spoon	Total Penetration	Length of Sample
1	0'-1'5"	18"	8"
U-1A-Tube	1'-3'	24"	12"
2	2'-3'6"	18"	6"
3	5-6'6"	"	17"
4	10-11'6"	"	15"
5	15'-16'6"	"	12"
6	20-21'6"	"	10"
7	25-26'6"	"	8"
8	30-31'6"	"	11"
9	35-36'6"	"	9"
10	38'6"-40'	"	18"

CORE DATA

Sample No.	Elevation Top	Elevation Bot.	Core Recovered	Boring Fee Per Hour

Type of Core Drill

Core Diameter

DO NOT WRITE ON BACK OF SHEET

W. M. WALSH COMPANY, INC.
North Bergen, New Jersey

Wantagh Water Plant — Nassau Co. N.Y.

TEST BORING DATA — TEST HOLE NO. B 19

Bridge | Rt. | Sec. | Sta. | Offset | Lt. Rt.

Borings made by: J. Sciamorelli Inspector — Date Started 11/10/66 Completed 10/11/

MHW El. | MLW El. | El. of Ground Water Tidal | Length of Casing Driven

Ground Line Elevation 1.7'

Depth in Feet	Blows Per Foot of Casing Penetration	Materials Encountered	Sample Number	Blows on Spoon 0/6	6/12	12/18
	1	Soft Meadow mat & organic silt	1	1	1	1
	1		2	-	2	2
	1	Loose- br. med to fine sand				
	3	tr. silt, tr. gravel & veg.				
5	3	Medium- br. fine to med.				
	13	sand. tr. silt & tr.	3	12	16	19
	19	gravel				
	25					
	22					
10	22					
	15		4	7	10	12
	24					
	26					
	28					
	29					
15	12	Loose br. med. sand.	5	3	3	4
	16	tr. gravel				
	21					
	21					
	23					
20	14	Loose br. med. sand.	6	4	3	4
	21					
	28					
	27	Running sand @25'				
	26					
25	19		7	3	3	4
	23					
	28					
	36					
	31					
30	20	Loose br. med. to fine	8	3	3	3
	26	sand.				
	28					
	30					
	32					
35	24		9	4	4	6
	35					
	64					
	43	6"				
		very stiff dk. gr. silty	10	9	10	15
40		clay				
45						
50						

Fill in with Black Drawing Ink

Inside Dia. of Casing 2½"
" " " Spoon 1 1/8"
Weight of Hammer on Casing 300
" " " " Spoon 140
Drop of Hammer on Casing 24"
" " " " Spoon 30"

DRY SAMPLE DATA

Sample No.	Elevation bottom of Spoon	Total Penetration	Length of Sample
1	0'-1'6"	18"	18"
2	2'3'6"	18"	7"
1A Tube	0'-2'	24"	21"
3	5'-6'6"	18"	9"
4	10'-11'6"	"	18"
5	15'-16'6"	"	12"
6	20-21'6"	"	5"
7	25'-26'6"	"	4"
8	30-31'6"	"	4"
9	35'-36'6"	"	8"
10	38'6"-40'	"	18"

CORE DATA

Sample No.	Elevation Top	Elevation Bot.	Core Recovered	Boring Feet Per Hour

Type of Core Drill _____

Core Diameter _____

DO NOT WRITE ON BACK OF SHEET

W. M. WALSH COMPANY, INC.
North Bergen, New Jersey

Wantagh Water Plant — sheet 1 of 2 — Nassau Co. New York

TEST BORING DATA — TEST HOLE NO. B-22

Bridge | Rt. | Sec. | Sta. | Offset | Lt. Rt.

Borings made by: J. Sciamorelli | Inspector T. Mueller | Date Started 11/2/66 | Completed 11/4/

MHW El. | MLW El. | El. of Ground Water Tidal | Length of Casing Driven

Ground Line Elevation + 2.2'

Depth	Sample Number	Blows on Spoon 0/6	6/12	12/18	Description
0	1		1		very soft br. meadow mat.
1	2		1		black organic silt
2	3	2	3	3	Loose Med. to fine Br. sand. tr. silt. tr. gravel
5	4	7	5	5	
10	5	5	9	9	Medium " " "
15	6	7	10	11	
20	7	5	6	6	Medium- Medv. fine br. sand some gravel
25	8	4	5	5	
30	9	4	1	2	Loose fine to med. br. sand.
35	10	4	3	4	
40	11	9	13	19	Loose gray fine silty sand. Dk. gray silty clay thin layers fine sand
45	12	7	9	14	
50					Continued sheet 2

Fill in with Black Drawing Ink

Inside Dia. of Casing	2½"
" " " Spoon	1 3/8"
Weight of Hammer on Casing	300 lbs.
" " " " Spoon	140 lbs.
Drop of Hammer on Casing	24"
" " " " Spoon	30"

DRY SAMPLE DATA

Sample No.	Elevation bottom of Spoon	Total Penetration	Length of Sample
1	0'-1'5"	18"	14"
2	1'5"-2'5"	"	10"
3	2'5"-4'	"	16"
4	5'-6'5"	"	
5	10'-11'5"	"	
6	15'-16'5"	"	
7	20'-21'5"	"	
8	25'-26'5"	"	
9	30'-31'5"	"	
10	35'-36'5"	"	
11	40'-41'5"	"	
12	45'-46'5"	"	

CORE DATA

Sample No.	Elevation Top	Elevation Bot.	Core Recovered	Boring Feet Per Hour

Type of Core Drill

Core Diameter

Note: Lost sample at 30'-31'5"

DO NOT WRITE ON BACK OF SHEET

North Bergen, New Jersey

Wantagh Water Plant sheet 2 of 2 Nassau Co. N.York

TEST BORING DATA TEST HOLE NO. B-22

Bridge Rt. Sec. Sta. Offset Lt. Rt.

Borings made by: J. Sciamorelli Inspector T. Mueller Date Started 11/2/66 Completed 11/4/66

MHW El. MLW El. El. of Ground Water Tidal Length of Casing Driven

Ground Line Elevation

Depth Feet	Blows Per Foot	Materials Encountered	Sample Number	Blows on Spoon 0/6	6/12	12/18
0	39					
	61	Stiff dk. gray silty clay	13	7	10	15
	87	thin layers fine sand.				
	119					
5	95					
	57		14	6	9	12
	91					
	114	Medium, gray fine				
	121	running sand. trace silt				
60	97					
	63		15	7	10	19
	94					
	121					
	179					
65	193					
	73	Dense coarse gray sand	16	19	41	57
	139	trace silt				
	156					
	151					
	160					
70	81	Hard, dk. gray silty	17	16	25	42
	161	clay. Lenses of fine				
	189	gray sand				
	171					
	181					
75	89		18	14	23	38
	139					
	153					
	170					
80	189					
		Bottom of Boring 81'5"	19	17	29	42
35						
40						
45						
50						

Inside Dia. of Casing 2½"
" " " Spoon 1 3/8"
Weight of Hammer on Casing 300 lbs.
" " " " Spoon 140" lbs.
Drop of Hammer on Casing 24"
" " " " Spoon 30"

DRY SAMPLE DATA

Sample No.	Elevation bottom of Spoon	Total Penetration	Length of Sample
13	50'-51'5"	18"	
14	55-56'5"	"	
15	60'-61'5"	"	
16	65-66'5"	"	
17	70'-71'5"	"	
18	75'-76'5"	"	
19	80'-81'5"	"	

CORE DATA

Sample No.	Elevation Top	Elevation Bot.	Core Recovered	Boring Feet Per Hour

Type of Core Drill

Core Diameter

Fill in with Black Drawing Ink

DO NOT WRITE ON BACK OF SHEET

W. M. WALSH COMPANY, INC.
North Bergen, New Jersey

Wantagh Water Plant — Nassau Co. N.Y.

TEST BORING DATA — TEST HOLE NO. B-26

Bridge | Rt. | Sec. | Sta. | Offset | Lt. Rt.

Borings made by J. Sciamorelli | Inspector | Date Started 11/15/66 | Completed 11/15

MHW El. | MLW El. | El. of Ground Water Tidal | Length of Casing Driven

Ground Line Elevation 2.56'

Depth in Feet	Penetration in Inches	Materials Encountered	Blows on Spoon 0/6	6/12	12/18	Sample Number
1	1	Very soft meadow mat & organic silt	1	1	1	1
1	3	Loose br. med. to fine sand tr. silt, tr. gravel	2	2	3	3
3	12	Med. Br. Med. to fine silty sand tr. gravel	3	7	7	9
5	13					
19	21					
23	27	Medium- Br. coarse sand tr. gravel.	4	6	8	11
10	12					
22	24					
19	19					
15	11		5	3	3	4
15	17	Loose Br. Med. sand.				
20	20					
20	13		6	3	4	4
19	22					
23	22					
25	14		7	4	3	3
20	20					
21	20					
30	16	Loose Br. fine to med. sand	8	3	4	4
23	29					
31	34					
35	27	Gr. fine silty sand (med.	9	6	9	11
47	59	Very stiff. dk. gray silty clay. lenses fine				
34		sand	10	9	11	14
40		Bottom of Boring 40'0"				
45						
50						

Fill in with Black Drawing Ink

Inside Dia. of Casing	2½"
" " " Spoon	1 3/8"
Weight of Hammer on Casing	300 lbs.
" " " " Spoon	140 lbs.
Drop of Hammer on Casing	24"
" " " " Spoon	30"

DRY SAMPLE DATA

Sample No.	Elevation bottom of Spoon	Total Penetration	Length of Sample
1	0'-1'6"	18"	8"
2	2'-3'6"	"	10"
3	5'-6'6"	"	5"
4	10'-11'6"	"	13"
5	15'-16'6"	"	7"
6	20'-21'6"	"	5"
7	25'-26'6"	"	11"
8	30'-31'6"	"	5"
9	35'-36'6"	"	11"
10	38'6"-40'	"	14"

CORE DATA

Sample No.	Elevation Top	Elevation Bot.	Core Recovered	Boring Feet Per Hour

Type of Core Drill _____

Core Diameter _____

DO NOT WRITE ON BACK OF SHEET

Converse Consultants, Inc.	TEST BORING LOG	BORING NO. B-1
PROJECT	Cedar Creek Plant Modifications, Wantagh, N.Y.	SHT. NO. 1 OF 3
CLIENT	Charles R. Velzy Assoc. Inc.	PROJ. NO. 83-08139-0
BORING CONTRACTOR	Slacke Test Boring Co., Inc.	ELEVATION +14.7±
GROUND WATER		DATUM Site
		DATE START 5-19-83
		DATE FINISH 5-20-83
		DRILLER R. Nimmo
		CC REP. KJL

DATE	TIME	DEPTH	CASING		CAS.	SAMP.	CORE	TUBE
5-19-83	3:25	26.1	60'	TYPE	Cpld.	S.S.		
5-20-83	8:45	11.5	60'	DIA.	2½"	2"		
5-20-83	10:00	11.5	40'	WT.	300#	140#		
				FALL	24"	30"		

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
			2		TOPSOIL 0.5	
1		S-1	6		Gr mfS,t.~$	HSA to 16' then switched to casin
			12			
2			10			
			9			
3		S-2	15			
			22		do FILL (Gray Sand, SP)	
4			23			
			5			
5		S-3	11		do	
			16			
6			19			
			19			
7		S-4	15		do	
			16			
8			17			
			6			
9		S-5	11		do w/t.fG	
			12			
10			12			
			9			
11		S-6	13			
			18		Gr fS,t.$ w/shell fgmts.	
12			19			
			4		do	PP=1.5 tsf
13		S-7	2			
			1		Br Pt. fibrous	
14			3		Brown Peat, Pt 14.5	
			2			
15		S-8	2		Br cFS,1.0$ w rts	
			4			
16	10		6			
17	22					
18	33	S-9			Interbedded Brown Silty Sand and Gray Silty Clay, SM-OH/CL	
19	23					
20	21					
			3			
21	18	S-9	3		Gr$yC wlyrs mfS 21.0	PP=1.25 tsf
			6			
22	31		8		Br mfS,t.$	
23	35					

FOR INTERPRETATION OF SOIL, ROCK AND GROUNDWATER CONDITIONS, SEE TEXT OF CONVERSE CONSULTANTS REPORT, OF WHICH THIS LOG IS A PART.

Converse Consultants, Inc.	TEST BORING LOG	BORING NO. B-101
PROJECT Cedar Creek Plant Modifications, Wantagh, NY		SHT. NO. 2 OF 3
CLIENT CRVA		PROJ. NO. 83-08139-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
24	37					
25	38					
26	20	S-10	6, 7		Br cfS,t.fG	
27	31		11, 9			
28	33					
29	34					
30	36					
31	23	S-11	14, 7, 8		do	Rec=3"
32	40		10			
33	31				Brown-tan Sand, SP	
34	35					
35	43					
36	35	S-12	12			
37	50		11, 11, 8			N.R.-Sand in wash
38	49					
39	43					
40	44					
41	44	S-13	7, 7, 9		Tn cfS,t.fG	
42	51		8			
43	49					
44	58				43.5	
45	73					
46	56	S-14	18, 15		Gr cfS, t.$,l.mfG/w. occ.lyrs. Gr $yC	
47	68		12, 13			
48	77					
49	72					

FOR INTERPRETATION OF SOIL, ROCK AND GROUNDWATER CONDITIONS, SEE TEXT OF CONVERSE CONSULTANTS REPORT, OF WHICH THIS LOG IS A PART.

Converse Consultants, Inc.	TEST BORING LOG	BORING NO. B-101
PROJECT Cedar Creek Plant Modifications, Wantagh, NY		SHT. NO. 3 OF 3
CLIENT CRVA		PROJ. NO. 83-08139-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
50	81	S-15	11		Gr vvd $yC w/prts mfS	PP=2.0-2.5 tsf
	87		13			
			17			
			15			
	82				Gray Silty Clay, varved, with frequent partings of Sand, CL	
	71					
55	70					
			5			
	90	S-16	9		do	PP >4.0 tsf
			16			
	86		18			
	96					
	77					
60	54					
			13			
		S-17	19			
			19		do	PP = 3.5 tsf
			16			
					End of Boring @ 62.0'	

FOR INTERPRETATION OF SOIL, ROCK AND GROUNDWATER CONDITIONS, SEE TEXT OF CONVERSE CONSULTANTS REPORT, OF WHICH THIS LOG IS A PART.

Converse Consultants, Inc.	TEST BORING LOG	BORING NO. B-102

PROJECT	Cedar Creek Plant Modifications, Wantagh, NY								SHT. NO. 1 OF 3
CLIENT	Charles R. Velzy Assoc., Inc.								PROJ. NO. 83-08139-01
BORING CONTRACTOR	Slacke Test Boring Co., Inc.								ELEVATION +14.7±
GROUND WATER					CAS.	SAMP.	CORE	TUBE	DATUM Site
DATE	TIME	DEPTH	CASING	TYPE	Cpld	S.S.			DATE START 5-24-83
5-24-83	3:15	9.9	12	DIA.	4/2½"	2"			DATE FINISH 5-25-83
				WT.	300#	140#			DRILLER R. Nimmo
				FALL	24"	30"			CC REP. KJL

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
			2		TOPSOIL 0.5	
1		S-1	7		Tn mfS, t⁻.$	
			8			
2			11			
			9			
3		S-2	15		Gr cfS, t⁻.$,1.⁻fG	
			20			
4			22			
			9			
5		S-3	18		do	
			25		FILL (Gray Sand, SP)	
6			28			
			24			
7		S-4	16		Gr mfS,t.⁻$	
			17			
8	66		13			
			7			
9	170	S-5	13		do w/t. shall fgmts	
			19			
10	200		19			
			36			@12', removed 4" dia. casing, and installed 2½" Rec=3"
11	100	S-6	18		do	
			23			
12	115		16			
			8			
13	29	S-7	7		do	
			8			
14	11		6		14.0	
			1		Black Organic Clayey	
15	10	S-8 A	2		Bk cfS, a.0$ w/Pt Sand with Peat, 15.0	
		B	8		Br cfS, 1.$, t.rts SM/OH-PT	
16	20		9			
17	35					
18	43				Brown tan Silty Sand,SM 18.5±	
19	46					
20	44					
			6			
21	30	S-9	9		Br cfS,t.$	
			9			
22	45		10			
23	51					

FOR INTERPRETATION OF SOIL, ROCK AND GROUNDWATER CONDITIONS, SEE TEXT OF CONVERSE CONSULTANTS REPORT, OF WHICH THIS LOG IS A PART.

Converse Consultants, Inc.	TEST BORING LOG	BORING NO. B-102
PROJECT Cedar Creek Plant Modifications, Wantagh, NY		SHT. NO. 2 OF 3
CLIENT CRVA		PROJ. NO. 83-08139-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
24	48					
	45					
25			9		Tn cfS, t¯.$,t.fG	
26	49	S-10	7			
			7			
27	54		9			
	51					
28						
	56					
29						
	59					
30			11			
	34	S-11	8		do	
31			10			
	41		11			
32						
	52				Brown-tan Sand, SP	
33						
	54					
34						
	45					
35			7			
	40	S-12	9		do	
36			10			
	44		12			
37						
	59					
38						
	56					
39						
	46					
40			8			
	41	S-13	11		Tn cfS,t.¯$	
41			11			
	57		13			
42						
	55					
43						
	58					
44						
	61					
45			7			
	52	S-14	9		do	
46			11			
	68		11			
47						
	69					
48					48.0+	
	83					
49						

FOR INTERPRETATION OF SOIL, ROCK AND GROUNDWATER CONDITIONS, SEE TEXT OF CONVERSE CONSULTANTS REPORT, OF WHICH THIS LOG IS A PART.

Converse Consultants, Inc.	TEST BORING LOG	BORING NO. B-102
PROJECT Cedar Creek Plant Modifications, Wantagh, N.Y.		SHT. NO. 3 OF 3
CLIENT CRVA		PROJ. NO. 83-08139-01

DEPTH FT.	CASING BLOWS	SAMPLE NO.	BLOWS ON SAMPLE SPOON PER 6"	SYMBOL	IDENTIFICATION	REMARKS
50	79					
	63	S-15	6 8		Gr vvd $yC, w prt fS $	PP=2.75-3.0 tsf
	83		8 9			
	85				Gray varved Silty Clay with frequent partings of fine Sand and Silt, CL	
	73					
55	75					
	81	S-16	7 11		do	
	87		15 18			
	93					
	97					
60	91					
		S-17	6 8		do	PP> 4.5 tsf
			10 11			
					End of Boring @ 62.0'	

FOR INTERPRETATION OF SOIL, ROCK AND GROUNDWATER CONDITIONS, SEE TEXT OF CONVERSE CONSULTANTS REPORT, OF WHICH THIS LOG IS A PART.

MUESER, RUTLEDGE, JOHNSTON & DESIMONE - CONSULTING ENGINEERS

SHEET 1 OF 3

PROJECT CEDAR CREEK WPCP EXPANSION

FILE NO. 6102

BORING NO. B-309

PROJECT LOCATION WANTAGH, NEW YORK

SURFACE ELEV. +16.7

RES. ENGR. BEN MUKHERJEE

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
0800	1D	0.0 2.0	PUSH	Topsoil				
	2D	5.0 7.0	1-1 1-1	Gray fine to medium sand, trace silt (SP-SM)	F	5		5'-80', used mud.
	3D	10.0 12.0	1-1 2-4	Gray fine to medium sand, trace coarse sand (SP)		10		
	4D	15.0 17.0	4-3 2-2	Medium gray organic silty clay, some peat (OH-Pt)	O	15		
	5D	17.0 19.0	5-4 5-6	Top: Do 4D (OH-Pt) Bot: Brown fine to medium sand, some organic silt (SM)	S&O	18 20		
	6D	20.0 22.0	2-2 1-2	Gray brown fine to medium sand, some silt (SM)		25		
	7D	25.0 27.0	8-8 8-13	Brown medium to fine sand, trace coarse sand, silt (SP)		30		
	8D	30.0 32.0	4-5 6-9	Gray fine to medium sand (SP)	S_1	35		
	9D	35.0 37.0	4-5 6-8	Do 8D, trace coarse sand (SP)		40		
	10D	40.0 42.0	4-5 5-6	Gray fine to coarse sand (SP)		45		
	11D	45.0 47.0	5-5 5-6	Gray fine to medium sand, trace silt (SP)		49 50		
	12D	50.0 52.0	7-7 7-7	Stiff gray silty clay, trace fine sand (CL)	C			

THURSDAY, 2-21-85 - SUNNY 33°

MUESER, RUTLEDGE, JOHNSTON & DESIMONE - CONSULTING ENGINEERS

SHEET 2 OF 3

FILE NO. 6102

PROJECT CEDAR CREEK WPCP EXPANSION

BORING NO. B-309

SURFACE ELEV. +16.7

PROJECT LOCATION WANTAGH, NEW YORK

RES. ENGR. BEN MUKHERJEE

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
						55		
	13D	55.0 57.0	5-5 5-7	Do 12D (CL)				
					C	60		
	14D	60.0 62.0	3-5 5-6	Do 12D (CL)				
FEBRUARY 21, 1985						65		
	15D	65.0 67.0	3-5 6-8	Do 12D (CL)				
						69		
						70		
	16D	70.0 72.0	10-9 7-7	Gray fine to medium sand (SP)				
					S_2	75		
	17D	75.0 77.0	8-11 14-21	Gray fine to medium sand, trace silt (SP-SM)				
1400	18D	78.0 80.0	7-9 11-16	Do 17D (SP-SM)		80		End of boring @ 80.0'.
						85		
						90		
						95		
						100		

PROJECT CEDAR CREEK WPCP EXPANSION BORING NO. B-309
LOCATION WANTAGH, NEW YORK
BORING LOCATION
SURFACE ELEVATION +16.7 DATUM NASSAU COUNTY DATUM

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG: ☒ TRUCK, ☐ SKID, ☐ TRIPOD, ☐ OTHER
TYPE OF FEED DURING CORING: ☐ MECHANICAL, ☐ HYDRAULIC ☐ OTHER
☒ CASING UTILIZED: DIAMETER, INCHES 4.0 , DEPTH FROM 0.0' TO 5.0'
DIAMETER, INCHES , DEPTH FROM TO
☒ DRILLING MUD UTILIZED: DIAMETER OF ROTARY BIT, INCHES 3-3/4, 2-15/16
TYPE OF DRILLING MUD REVERT
☐ AUGER UTILIZED: TYPE AND DIAMETER, INCHES
TYPE AND SIZE OF:
DRILL RODS BW . D-SAMPLER 2" O.D. SPLIT SPOON
S-SAMPLER . U-SAMPLER
CORE BARREL . CORE BIT
CASING HAMMER: WEIGHT, POUNDS , AVERAGE FALL, INCHES
SAMPLER HAMMER: WEIGHT, POUNDS 140 , AVERAGE FALL, INCHES 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE	DEPTH OF CASING	DEPTH TO WATER	CONDITIONS OF OBSERVATION*
2-21-85	1400	80.0	5.0'	11.5'	MUD LEVEL

*Note reliability of observation, rainfall, elevation of nearby open water, tide gauge or other factors affecting water level recorded.

☐ PIEZOMETER INSTALLED. SKETCH SHOWN ON
STANDPIPE: TYPE , ID , LENGTH , TOP ELEV.
INTAKE POINT: TYPE , OD , LENGTH , TIP ELEV.
FILTER: MATERIAL , OD , LENGTH , BOT. ELEV.

PAY QUANTITIES

2½" DIA. DRY SAMPLE BORING, LIN. FT. 80.0 . NO. OF 2" SHELBY TUBE SAMPLES
DIA. U-SAMPLE BORING, LIN. FT. . NO. OF 3" UNDISTURBED SAMPLES
CORE DRILLING IN ROCK, LIN. FT. . OTHER

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER MIKE IMPARATO HELPERS JAKE HARRIS, JR.
REMARKS
RESIDENT ENGINEER BEN MUKHERJEE DATE 2-21-85

NOTES:

1. Make a separate log of each boring and each unsuccessful attempt. Keep a copy of all logs in the field.
2. In daily progress column indicate depth at beginning and end of work day, calendar date, time at beginning and end of work day and weather conditions.
3. All samples shall be numbered in consecutive order regardless of type; dry samples D, wash samples W, shelby tube samples S, fixed piston samples U. Do not assign numbers to lost samples but record blows and reasons for lack of recovery.
4. Mark each U-sample with boring number, sample number, depth, recovery and job number.
5. Record blows on sampler per six inches of penetration. Note all blows and penetrations when taken at less than six inch intervals. Indicate method by which penetration of tube sampler was obtained.
6. Indicate changes of material in strata column and list generalized strata description.
7. List under remarks the manner by which changes in material were detected, all obstructions, any loss or gain of wash water including amount, the recovery of rock core in feet and inches and per cent of run, Rock Quality Designation (RQD) in per cent and any unusual occurrences.
8. Include sample description by Unified Soil Classification System.
9. Obtain water level at the beginning of each day and at all other times when stable water conditions exist.

SUBSOIL
INVESTIGATIONS

SOIL MECHANICS DRILLING CORP.
3770 MERRICK ROAD • SEAFORD, L. I., NEW YORK 11783
(516) 221-2333 • FAX (516) 221-0254

August 22, 2023

H2M Group
538 Broad Hollow Road, 4th Floor East
Melville, NY 11747
Attn: Steven C. Hearl, PE

Re: Nassau County-DPW
Cedar Creek Water
Pollution Control Plant
Wantagh, NY
H2M#NCDP2202
Our Job #23-051

Gentlemen:

Forwarded herewith is our Drawing #23R051.2 illustrating the logs and locations of two (2) test borings drilled recently at the above referenced site.

The purpose of this subsurface investigation was to determine the nature and extent of the underlying soil deposits as well as their drainage and structural engineering characteristics relative to the proposed building addition foundation(s).

Two (2) test borings were drilled; Boring B-1 to a depth of 25 feet and Boring B-2 to a depth of 32 feet, both using truck-mounted drilling equipment. The borings were advanced using hollow stem auger casing. Sample recovery was obtained in accordance with ASTM D-1586 procedures using a Central Mine Equipment (CME) automatic SPT trip hammer. The number of hammer blows required to advance the split spoon sampler over each 6" interval was recorded and is shown on the boring logs. Continuous split spoon samples were taken for the top 12 feet then every 5 feet thereafter to the final depths of the borings. A written description of the recovered soil samples per our geologist's visual identification of same using the Unified Soil Classification System (USCS) is also presented on the logs.

The CME automatic hammer operates with an efficiency of approximately 90%. The original conventional use of rope, cathead and drop weight, on the other hand, operates with an efficiency of approximately 60%. As a consequence, the standard penetration test results obtained using the CME auto-hammer are on the order of two-thirds the value that would have been obtained had the original rope and cathead method been used. This is significant if you are using design charts for soil strength parameters based on historical data associated with the rope and cathead method. If so, you should adjust our data accordingly.

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Our investigation revealed the areas drilled are blanketed by a few inches of soft organic Loam and/or a generally loose mixed soil Fill containing a trace of Gravel, thin fine roots and shell fragments extending down to 13 feet below existing grade. The surficial Fill is followed by layers of loose Sands, soft compressible Peat and soft Clays extending down to from 18 feet to 23 feet below existing grade. These upper soils are underlain, generally, by a moderately dense to dense Sand formation containing varying percentages of Silt and Gravel extending down to the deepest depths drilled.

Ground water was encountered at Boring B-1 at a depth of 17'6" and at Boring B-2 at a depth of 16'4" below existing grade at the time the work was done and is under tidal influence due to the site's close proximity to the water.

The soil layers identified under the Unified Soil Classification System (USCS) by our geologist as "SM", "CL", "PT" and "OL" exhibits poor drainage characteristics. On the other hand, the material classified as "SP", exhibits good drainage characteristics.

Frost penetration in this area is 3 feet. All exterior foundations/footings and pile caps must have a minimum of 3 foot of cover or as directed otherwise by the frost depth of the locality.

Based on the Standard Penetration Test (SPT) blow counts, of the loose and soft layers below the groundwater table, Liquefaction may be a problem and, therefore, should be a design consideration. However, this can be addressed by delivering future proposed loads to the more competent underling soil.

The soils generated by this investigation best fit that of Seismic Site Class "E" in accordance with Section 1613.5.2 of the New York State Building Code.

The following is a summary of information that we can provide at this time based upon our subsurface investigation:

Considering the depth of the loose Fill and soft compressible layers below the Fill in addition to the depth to the ground water table, it is recommended that any substantial structure planned for this site be supported on deep foundation elements (i.e. piles) installed through the upper unsuitable material and into the lower moderately dense to dense Sand stratum below. Pile type, size and capacity are dependent on loads.

Traditionally, timber or steel pipe piles have been utilized. Timber/Steel piles are installed using dynamic installation equipment which cause some ground vibrations that might adversely affect nearby structures. If this is not of concern, then there is no downside to their use. Should existing site restrictions not accommodate a timber pile rig and/or if the dynamic installation of piles is not an option due to vibration sensitive structures, then a drilled-in pile is recommended. Drilled-in piles generate little to no vibrations and can be installed with minimal head space and in other limited-access conditions. Typical drilled-in pile which can generate high compression loads are micropiles and auger cast concrete piles (also known as hollow stem auger or HSA piles). Micropiles are capable of developing high compression as well as higher uplift and lateral loads by means of a bond zone in the soil however, installation costs can sometimes be high. Micropiles also have the capability of being drilled through obstructions. HSA's can be installed as either a displacement pile or a non-displacement pile. In either case, the installation of this type of pile generates a wet working environment due to spoil and/or grout spillage. The installation of either of the pile(s) type noted above should be performed by a specialty contractor with five or more years of experience.

Drag down (negative skin friction) should also be considered in determining the piles net allowable load capacity.

Load testing requirements shall be in accordance with the governing municipality and/or building official.

Recommended soil parameter ranges and values for the lower moderately dense to dense "SP/SM" stratum (based on dry conditions) are as follows:

- Soil Unit Weight (γ gamma): 115-130 pounds cubic foot (pcf);
- Angle of Internal Friction (Φ Phi): 28° - 30°;
- Active Earth Pressure Coefficient (Ka): 0.333;
- Passive Earth Pressure Coefficient (Kp): 2.00; and
- At Rest Earth Pressure Coefficient (K0): 0.5

Soil samples recovered during drilling operations will be stored in our lab for a period of 30 days after which they will be destroyed. During this period, we will deliver these samples to any prescribed location upon request.

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If after you examine the enclosed you have any further questions, please feel free to call and discuss them with us.

Billing is enclosed.

Very truly yours,

SOIL MECHANICS DRILLING CORP.

Stephen Lawniczak, P.E.

SL:mlf
Enclosures

TB-1

(EL. 102.3'±) GROUND SURFACE

1	1	2/3 6/9	17"	DARK BRN. ORGANIC LOAM (OL) (6)	
				DARK BRN. SILTY SAND, TR. GRAVEL, THIN FINE ROOTS (SM) (FILL) (7)	
	2	6/3 3/4	18"	BRN. FINE MEDIUM-SAND, TR. GRAVEL, COARSE SAND, TR. TO LITTLE SILT (SP-SM) (FILL) (7)	
5	3	4/3 3/2	17"	BRN.-TAN FINE SAND, TR. GRAVEL, SILT, MEDIUM SAND (SP) (FILL) (7)	
	4	3/2 1/2	18"	BRN. FINE SAND, TR. MEDIUM COARSE SAND, SILT, VERY - SMALL CLUMPS OF - GRAY SILTY CLAY (SP) (FILL) (7)	
10	5	1/1 2/1	19"	BRN. FINE MEDIUM-SAND, TR. GRAVEL, COARSE SAND, SAND, SILT, SMALL CLUMPS - OF DARK BRN. SILTY-SAND (SP) (FILL) (7)	
	6	2/2 3/3	19"	TAN-BRN. FINE SAND, TR. GRAVEL, MEDIUM SAND, SILT, SHELL FRAGMENTS (SP) (FILL) (7)	
15				GRAY FINE SAND, TR. SILT WITH DARK - GRAY SILTY FINE - SAND (SP-SM) (6)	
	7	3/3 2/2	17"	DARK BRN. PEAT (PT) (6)	
				DARK BRN. PEAT WITH DARK BRN. ORGANIC-SANDY SILT, TR. ROOTS (PT-OL) (6)	
20	8	9/11 14/21	19"	BRN. SAND, TR. GRAVEL, TR. TO LITTLE SILT (SP-SM) (3a)	
25	9	7/9 14/16	20"	BRN. SAND, TR. TO LITTLE GRAVEL TR. SILT (SP) (3a)	
				END OF BORING 25'-0"	

TIDAL INFLUENCE ? 17'-6" 10:56 AM

FEET	NO	SB	REC	CLASSIFICATION

TB-2

(EL. 103.0'±) GROUND SURFACE

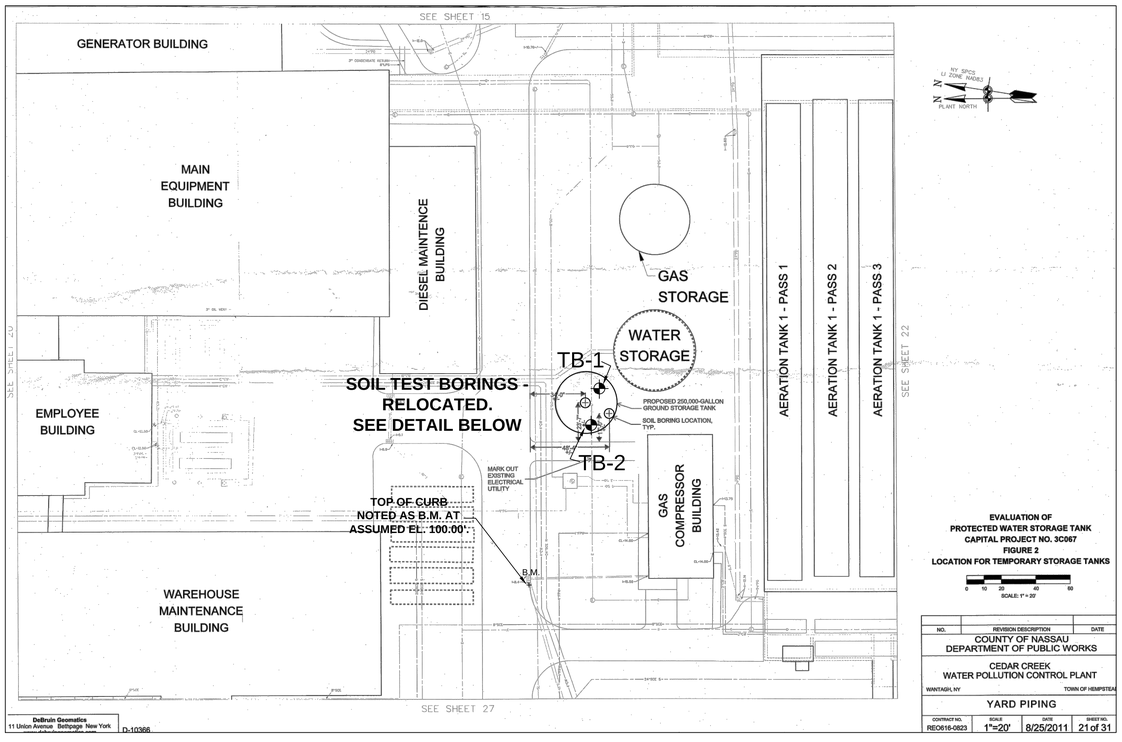
1	1	1/2 2/2	16"	BRN. MEDIUM FINE - SAND, TR. GRAVEL, COARSE SAND, THIN FINE ROOTS, LITTLE SILT (SP-SM) (FILL) (7)	
	2	2/1 1/1	14"	BRN. MEDIUM FINE - SAND, TR. GRAVEL, COARSE SAND, SHELL FRAGMENTS, TR. TO LITTLE SILT (SP-SM) (FILL) (7)	
5	3	2/2 1/2	17"	TAN-BRN. FINE SAND, TR. GRAVEL, SILT, MEDIUM COARSE SAND (SP) (FILL) (7)	
	4	5/6 7/8	18"	LIGHT GRAY FINE - SAND, TR. SHELL - FRAGMENTS (SP) (HYDRAULIC FILL?)	
10	5	8/10 10/12	19"		
	6	8/11 17/24	17"	LIGHT GRAY SAND, TR. GRAVEL, SHELL FRAGMENTS (SP) (HYDRAULIC FILL?)	
15				BRN. PEAT (PT) (6)	
	7	2/2 2/3	17"		
20	8	WOH/WOH 1/1	17"	GRAY SILTY CLAY, TR. GRAVEL, SAND, THIN FINE ROOTS (CL) (6)	
25	9	5/6 7/9	18"	BRN.-GRAY BRN. - SAND, TR. GRAVEL, SILT (SP) (3b)	
	10	7/8 9/10	19"	BRN. SAND, TR. GRAVEL, TR. TO LITTLE SILT (SP-SM) (3b)	
				END OF BORING 32'-0"	

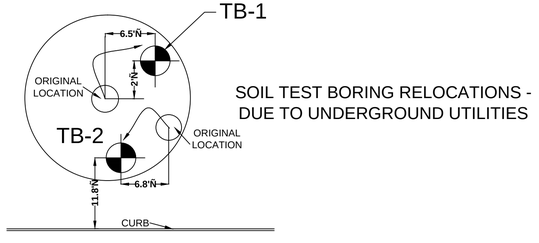
TIDAL INFLUENCE ? 16'-4" 11:47 AM

FEET	NO	SB	REC	CLASSIFICATION

NOTES

1. SOIL DESCRIPTIONS ARE BY VISUAL EXAMINATION OF SOIL SAMPLES RECOVERED DURING DRILLING OPERATIONS.
2. SOIL DESCRIPTIONS ARE IN ACCORD WITH THE UNIFIED SOIL CLASSIFICATION SYSTEM.
3. GROUND WATER WAS MEASURED INSIDE THE DRILL CASING AT THE COMPLETION OF EACH BOREHOLE.
4. GROUND WATER WHERE ENCOUNTERED AT THIS SITE IS UNDER TIDAL INFLUENCE.
5. SOIL STRATIFICATIONS ARE ACCURATE TO WITHIN TWO FEET VERTICALLY.
6. SOIL SAMPLES FOR BORING TB-1 AND TB-2 WERE OBTAINED USING A STANDARD 2" O.D. SPLIT SPOON SAMPLER ADVANCED INTO THE SOIL FORMATION VIA - THE USE OF A CENTRAL MINE EQUIPMENT (CME) STANDARD PENETRATION AUTO TRIP HAMMER 140 lb. HAMMER AND 30 INCH DROP.
7. SOIL TEST BORING GROUND SURFACE ELEVATIONS SHOWN ARE REFERENCED TO TOP OF CURB AT ASSUMED B.M. EL. 100.00'.





SOIL TEST BORING RELOCATIONS - DUE TO UNDERGROUND UTILITIES

UNIFIED SOIL CLASSIFICATION

SOIL GROUPS	TYPICAL NAMES AND SOIL SYMBOLS
1a Thru 1d	BEDROCK
GW	WELL GRADED GRAVELS, GRAVEL SAND MIXTURES, LITTLE OR NO FINES
GP	POORLY GRADED GRAVELS OR GRAVEL SAND MIXTURES. LITTLE OR NO FINES
GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURE
GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURE
SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
SP	POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
SM	SILTY SANDS, SAND - SILT MIXTURES
SC	CLAYEY SANDS, SAND - CLAY MIXTURES
ML	INORGANIC SILTS, VERY FINE SANDS, CLAYEY SILTS, SLIGHT PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS SANDY CLAYS, SILTY CLAYS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS

ALLOWABLE SOIL BEARING PRESSURES, N.Y.C. BLDG. CODE TABLE 1804.1

CLASS OF MATERIALS (Notes 1 and 3) *	MAXIMUM ALLOWABLE FOUNDATION PRESSURE (TSF)	MAXIMUM ALLOWABLE FOUNDATION PRESSURE (kPa)
1. BEDROCK (NOTES 2 and 7) *		
1a HARD SOUND ROCK - GNEISS, DIABASE, SCHIST	60	5,746
1b MEDIUM HARD ROCK - MARBLE, SERPENTINE	40	3,830
1c INTERMEDIATE ROCK - SHALE, SANDSTONE	20	1,915
1d SOFT ROCK - WEATHERED ROCK	8	766
2. SANDY GRAVEL & GRAVEL (GW, GP) (NOTES 3, 4, 8, and 9) *		
2a DENSE	10	958
2b MEDIUM	6	575
3. GRANULAR SOILS (GC, GM, SW, SP, SM, & SC)(NOTES 4, 5, 8, and 9)		
3a DENSE *	6	575
3b MEDIUM	3	287
4. CLAYS (SC, CL, & CH)(NOTES 4, 6, 8, and 9)		
4a HARD	5	479
4b STIFF	3	287
4c MEDIUM	2	192
5. SILTS & SILTY SOILS (ML & MH)(NOTES 4, 8, and 9) *		
5a DENSE	3	287
5b MEDIUM	1.5	144
6. ORGANIC SILTS, ORGANIC CLAYS, PEATS, SOFT CLAYS, LOOSE GRANULAR SOILS, & VARVED SILTS	SEE 1804.2.1 *	SEE 1804.2.1 *
7. CONTROLLED & UNCONTROLLED FILLS	SEE 1804.2.2 OR 1804.2.3 *	SEE 1804.2.2 OR 1804.2.3 *

*REFER TO SECTION 1804.2 OR NOTES FOLLOWING TABLE 1804.1 IN THE N.Y.C. BLDG. CODE FOR ADDITIONAL INFORMATION

COMPACTION RELATED TO SPOON BLOWS PER FOOT

SAND & SILT		CLAY	
LOOSE	LESS THAN 10	SOFT	4 OR LESS
MEDIUM	10 TO 30	MEDIUM	GREATER THAN 8 TO 30
DENSE	GREATER THAN 31	HARD	GREATER THAN 30

" N " STANDARD PENETRATION TEST - ASTM 1586 2" SPOON, 140lb HAMMER @ 30" FALL

N=17 BLOWS PER FOOT — SPOON BLOW COUNT IS GENERALLY SHOWN IN 6" INCREMENTS FOR 2' DRIVE

TO OBTAIN BLOWS PER FOOT (N) USE THE 2ND & 3RD 6" INCREMENT

	ROTARY CASING	EXTRA HEAVY CASING	SAMPLE SPOON
SIZES, INCHES	2.5		2.0
HAMMER WEIGHT, POUNDS			140
HAMMER FALL, INCHES			30

CB - CASING BLOWSPER 1 FOOT DRIVE
SB - SPOON BLOWS PER 6 INCH DRIVE
P - PUSHED BY WEIGHT OF HAMMER
WOR - WEIGHT OF ROD

UD - UNDISTURBED SOIL SAMPLE
NO - SAMPLE NUMBER
FEET - DEPTH FROM GND. SUR. NOTED AT EACH 5'
WOH - WEIGHT OF HAMMER
REC - SOIL RECOVERY IN INCHES

H2M ARCHITECTS & ENGINEERS
538 BROAD HOLLOW ROAD
4th FLOOR EAST
MELVILLE, NEW YORK 11747

SOIL MECHANICS DRILLING CORP.
subsoilinvestigations
3770 MERRICK ROAD * SEAFORD, NEW YORK 11783 * 516 - 221-2333

SUBSURFACE INVESTIGATION

EVALUATION OF PROTECTED WATER STORAGE TANK

3340 MERRICK ROAD

WANTAGH, NEW YORK

VERTICAL BORING SCALE:	DRAWING DATE			DRAWING NUMBER
1/2" = 1'-0" UNLESS NOTED OTHERWISE	AUGUST 18, 2023			23R051.2
DATES OF BORING	DRAWN BY:	CHECKED BY:	REVISED DATE:	SHEET 1 OF 1
AUGUST 17, 2023	NAR	SHL		

Z: 23RDWGS/23R051.2