BID FORM

CENTRAL HOMES PUMP STATION FORCE MAIN REPLACEMENT
IN THE CITY OF GLEN COVE
NEW YORK, 11542
CONTRACT NO. S3P312-13G GENERAL CONSTRUCTION

NAME OF BIDDER:_____

TO BE COMPLETED BY BIDDER SUBMITTING BID ON
CENTRAL HOMES PUMP STATION FORCE MAIN REPLACEMENT
IN THE CITY OF GLEN COVE, NEW YORK
CONTRACT NO. S3P312-13G GENERAL CONSTRUCTION

ITEM NO.	TYPE	DESCRIPTION		
1	Base Bid (Lump Sum)	LUMP SUM PRICE for furnishing all labor, equipment, materials, supervision and incidentals necessary to complete the work and make ready for operation.		
2	Allowance	ALLOWANCE NO. 1: for cleaning and/or coating the force main terminal manhole as directed by the County.		
3	Allowance	ALLOWANCE NO. 2: for unforeseen conditions not specifically characterized in the Contract Documents but required to complete the project.		
4	Unit Price	Additional Authorized Excavation. Estimated quantity of 100 cubic yards.		

_____

_____

_____

_____

NOTE TO BIDDER: Include a separately sealed envelope containing a list of all subcontractors the bidder will use to perform (*a*) plumbing and gas fitting, (*b*) heating, ventilating and air conditioning, and (*c*) electric wiring and standard illuminating fixtures; and the respective agreed-upon amount to be paid to each subcontractor. Write on the outside of the envelope the bidder's name, the contract number, and the words "List of Subcontractors".

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CONTRACT NO. S3P312-13G
GLEN COVE AREA COLLECTION SYSTEM IMPROVEMENTS
CENTRAL HOMES PS FORCE MAIN

TABLE OF CONTENTS

DIVISION 3 CONCRETE

The pages of this document are numbered consecutively. Prospective bidders must examine the documents carefully and, before bidding, must advise the Commissioner, in writing, if any pages are missing and must request that such missing pages be furnished to them.

SECTION 01010

SUMMARY OF WORK

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 the furnishing of equipment, superintendence, labor, skill, material and all other items necessary for the demolition, modification and construction associated with the Central Homes Pump Station Force Main Replacement – Contract No. S3P312-13G as shown on the Contract Drawings and specified herein. This is a single prime contract; all references to multiple contractors, the General Construction Contractor, the HVAC Contractor, the Electrical Contractor, Prime Contractors and alphanumeric designations for these Contractors shall be deemed to refer to the sole contractor for Contract No. S3P312-13G.

B. The existing pump station will be maintained in continuous operation by the County during the entire construction period of the contract. Work under the Contract shall be so scheduled and conducted by the Contractor that such Work will not impede any treatment process, reduce the quality of the pump station effluent or cause odor or other nuisance. In performing the Work shown and specified, the Contractor shall plan and schedule his Work to meet the pump station operating requirements.

C. The construction sequence, as described in Section 01700, Maintenance of Plant Operations, must be followed so that the County is able to maintain continuous operation of the existing pump station.

D. Before bidding, the Contractor shall visit the site of the work. The Contractor shall obtain all necessary information and make their own determinations of any and all conditions which may affect in any way the performance of their work and their bid prices under the Contract. All pertinent data and dimensions with regard to existing construction shall be verified by the Contractor.

E. The contractor shall provide parking for work force off site at the contractor's expense. No on-site parking will be allowed. No staging of vehicles on-site will be allowed

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

G. Additional details concerning storm water permit compliance and pollution prevention plans can be found in the Federal Regulations 40 CFR 122 & 123.

1.02 WORK COVERED BY CONTRACT DOCUMENTS

A. The foregoing is a general outline of work only and shall not be construed as complete description of the Work to be performed under the Contract.

1. <u>Force Main Replacement</u>
   a. Installation of 8” HDPE force main

b. Installation of all manholes, valves, and fittings, etc., associated with the new 8" force main
c. Restoration

1.03 GENERAL

A. The Central Homes Pump Station is located on Meadowfield Lane in Glen Cove, New York.

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

C. 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.

D. 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.

1.04 PRIME CONTRACTS

A. The Work under this Contract shall be the responsibility of a single Prime Contractor skilled in the installation of the systems as described. The Prime Contractor may subcontract such Work as it requires mechanics other than those he normally employs, but the entire responsibility for complete performance of the respective Prime Contract shall remain with the Prime Contractor referred to above.

For additional Subcontractor requirements, see the Agreement, Article XV, "Limitations and Consent", and Article XVI, "Responsibility".

B. The Technical Specifications of the Contract Documents include descriptions of all classifications of Work under this Project. Wherever used in a section of Division 2 through Division 16, the term "Contractor" shall refer to the Prime Contractor who is assigned the major work of that Section (unless specifically referred to otherwise).

C. The Prime Contractor shall cooperate and coordinate his Work with the Work of any other Contractor, utility service company or County personnel as more fully set forth in the General Conditions, Article GC-7, "Coordination with other Contractors" and Article GC-14, "Contractor Submissions", Paragraph D, Coordination Drawings.

1.05 CONTRACT DOCUMENTS

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

1.06 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 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 Detailed Specifications.

1.07 COORDINATION AND INTERFERENCES

A. The Engineer's Drawings are generally diagrammatic and indicative of the work and as such cannot show actual construction conditions. Perform modifications in the work to compensate for minor interferences and structural obstructions as part of the Work and at no increase in Contract Price.

B. Interference With The Protection Of Streets And Sidewalks.
   1. The Contractor shall not close or obstruct any portion of a street, road or private way without obtaining permits or authorization therefore from the proper authorities. If any street or private way shall be rendered unsafe by the Contractor's operation, the Contractor shall make such repairs or provide such temporary ways or guards acceptable to the Engineer. The temporary stoppage of traffic flow in either direction shall be limited to five (5) minute alternate intervals.
   2. Streets, roads, private ways, and walks not closed shall be maintained passable by the Contractor at his expense, and the Contractor shall assume full responsibility for the adequacy and safety of provisions made.
   3. State Highways and streets other than State Highways: Install temporary pavement over all areas where existing pavement has been removed by the end of each workday.
   4. For work progressing along paved streets, roads, private ways, and walks, the Contractor shall have a functional power broom on site to maintain these areas, clean, clear and free, for the passage of vehicles and pedestrians.

C. The Contractor shall, 72 hours in advance of closing any street, notify the police, fire and ambulance departments in writing, with a copy to the Engineer. The Contractor shall cooperate with the police department in the establishment of alternate routes and shall provide adequate, plainly marked detour signs with no increase in contract price.

D. Maintaining Sewage Flows
   1. It is essential to the operation of the existing sewer lines, whether private or public, that there is no interruption in the flow of sewage. The Contractor shall provide, maintain and operate all temporary facilities such as dams, pipe plugs, pumping equipment, sewers, conduits and all other labor and equipment necessary to intercept the sewage flow before it reaches the points where it would interfere with the work, carry it past the work area, and return it to the process point below.
   2. Bypassing / overflowing of sewage to waterways or ground surfaces <u>will not</u> be permitted.
   3. No additional payment or extension of time will be made to the Contractor for maintaining sewage flows.

E. Contractor Working Area Limits
   1. All sewers and appurtenances must be constructed within the existing right-of-way and not on private property.
   2. Disturbance shall be kept to a minimum within the right-of-way. All surface areas disturbed by the Contractor's operations will be restored to a condition equal to or better than that condition which existed prior to construction.

1.08 TIME OF WORK

A. Overtime work by each Contractor necessary to comply with the requirements of the Contract Documents 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 Contractor shall have sufficient construction materials, labor, equipment, tools and supervision to support scheduled overtime or second shifts when required.

C. Should circumstances arise during the course of the Contract, where the Contractor works outside of the County's regular working hours (7:00am to 3:30pm, 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 per the approved baseline schedule (resource loaded); the Contractor will reimburse the County for the cost of providing inspection and/or plant assistance, at a rate of $175 per hour per staff member. 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.

D. 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.

E. 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.

F. If it shall become imperative to perform Work at night, the County shall be informed a reasonable time in advance of the beginning of such Work. 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 01500, Temporary Facilities and Controls.

G. 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 his Work against damage or injury from the weather, and when Work is permitted during freezing weather, he/she shall provide and maintain approved facilities for heating the materials and for protecting the finished Work.

H. The Contractor shall request 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 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 this Contract. The Official County Holidays are:

New Years Day

Martin Luther King, Jr. Day

Lincoln's Birthday

Washington's Birthday

Memorial Day

Independence day

Labor Day

Columbus Day

Election Day

Veteran's Day

Thanksgiving Day

Friday after Thanksgiving Day

Christmas Day

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 County, County's Representative and/or Pump Station 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 County, County's Representative and Pump Station 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.

1.09 WORK BY OTHERS

A. County will perform the following work:

1. Operate all pertinent existing pump station valves and pump station functions.

1.10 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.

1.11 SITE INSPECTIONS

A. In order to arrange for an inspection of the site, the bidder shall contact Ms. Karen Fay, project engineer from the County's Water and Wastewater Engineering Unit, telephone (516) 571-7534 or via email at kfay@nassaucountyny.gov. For further details regarding "Bidder Responsibility" refer to the "Instruction to Bidders" Section of these Specifications.

1.12 CONTRACTOR'S RESPONSIBILITY FOR TEMPORARY HEATING

A. Temporary Heating shall be furnished and maintained by the Contractor as specified in Section 01500.

1.13 RESPONSIBILITY FOR TEMPORARY LIGHTING

A. Temporary lighting shall be furnished and maintained by the Contractor as specified in Section 01500.

1.14 WORKING MEETING

A. One working meeting will be held after award of Contract, but prior to starting work at the site to review all details, delivery of submittals, training and planning of work for completion in time. This meeting is in addition to all other meetings specified elsewhere in this Contract.

PART 2 PRODUCTS - (NOT USED)

PART 3 EXECUTION - (NOT USED)

END OF SECTION

SECTION 01020

ALLOWANCES

PART 1 GENERAL

1.01 DESCRIPTION

A. The allowances described below are to provide specific services, materials or work related to the Central Homes Pump Station Force Main Replacement and related work included herein and shall be included in the Contractor's Bid. The use of the allowances by the Contractor shall only be by written authorization or instruction from the Engineer and County. Any amounts not expended at the completion of the work shall be deducted from the final payment to the Contractor as a credit change order. 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. Contract No. S3P312 - 07G – General Construction
   1. Item No. 1 (Manhole Repair Allowance): An allowance of fifty thousand dollars ($50,000) for cleaning and/or coating the existing force main discharge manhole located on Forest Avenue.
   2. Item No. 2 (Construction Contingency Allowance): An allowance of seventy five thousand dollars ($75,000) for additional miscellaneous work.

1.03 BASIS FOR PAYMENT

A. Contract No. S3P312 - 07G – General Construction
   1. Item No. 1 (Manhole Repair Allowance): The amount of compensation to be paid to the contractor under the allowance for cleaning and/or coating the existing force main discharge manhole, as directed or authorized by the County, shall be determined (1) by such applicable unit prices, if any, as set forth in the Contract; or, (2) by lump sum or unit prices mutually agreed upon by the Commissioner and the Contractor; or, (3) the cost may be determined by the actual cost of labor and materials, plus overhead and profit, cost to be determined as the work progresses in the manner specified in Agreement, Article XXII (“Extra Work”), paragraph C.
   2. Item No. 2 (Construction Contingency Allowance): The amount of compensation to be paid to the contractor under the allowance for miscellaneous additional work, as directed or authorized by the County, shall be determined (1) by such applicable unit prices, if any, as set forth in the Contract; or, (2) by lump sum or unit prices mutually agreed upon by the Commissioner and the Contractor; or, (3) the cost may be determined by the actual cost of labor and materials, plus overhead and profit, cost to be determined as the work progresses in the manner specified in Agreement, Article XXII (“Extra Work”), paragraph C.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

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SECTION 01050

FIELD ENGINEERING

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". All Prime Contractors 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. Arrange for record utility mark-outs.
   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 Engineer to check line and grade points placed by 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. 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 work day. This projection must include:
      a. Location of all areas in which construction will be done, including 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 interferences and immediately advise Engineer of all discrepancies noted.
   6. Cooperate with Engineer in field inspections as required.

1.03 QUALIFICATIONS OF SURVEYOR OR ENGINEER

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 work and major Site improvements, prepare a certified survey showing all dimensions, locations, angles and elevations of construction.

1.05 SUBMITTALS

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

PART 2 PRODUCTS – (NOT USED)

PART 3 EXECUTION – (NOT USED)

SECTION 01072

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:

AMCA	-Air Moving and Conditioning Association, Inc.
AASHTO	-American Association of State Highway and Transportation Officials
ABMA	-American Boiler Manufacturers' Association
ACI	-American Concrete Institute
ACIFS	-American Cast Iron Flange Standards
AFBMA	-Anti-Friction Bearing Manufacturers Association
AGA	-American Gas Association
AGMA	-American Gear Manufacturers Association
AIA	-American Institute of Architects
AISC	-American Institute of Steel Construction
AISI	-American Iron and Steel Institute
ANSI	-American National Standards Institute
APA	-American Plywood Association
API	-American Petroleum Institute
ASCE	-American Society of Civil Engineers
ASME	-American Society of Mechanical Engineers
ASTM	-American Society for Testing and Materials
AWPA	-American Wood Preservers Association
AWS	-American Welding Society

AWWA	-American Water Works Association
CGA	-Compressed Gas Association
CRSI	-Concrete Reinforcing Steel Institute
CMAA	-Crane Manufacturers' Association of America
DIPRA	-Ductile Iron Pipe Research Association
EEI	-Edison Electric Institute
EJMA	-Expansion Joint Manufacturers' Association
Fed Spec	-Federal Specifications
FM	-Factory Mutual
HMI	-Hoist Manufacturers' Institute
IEEE	-Institute of Electrical and Electronic Engineers
IPCEA	-Insulated Power Cable Engineers Association
NACE	-National Association of Corrosion Engineers
NB	-National Board of Boiler Pressure Vessels
NBS	-National Bureau of Standards
NEC	-National Electric Code
NEMA	-National Electrical Manufacturers Association
NFPA	-National Fire Protection Association
NYSDOT	-New York State Department of Transportation
OSHA	-Occupational Safety and Health Act
PCA	-Portland Cement Association
PCI	-Pre-stressed Concrete Institute
RMA	-Rubber Manufacturers' Association
SMACCNA	-Sheet Metal and Air Conditioning Contractors National Association
SPI	-Society of Plastics Industry
SSPC	-Steel Structures Painting Council

STI -Steel Tank Institute

UL -Underwriters' Laboratory

New York State Building Code

Article XI of the Nassau County Public Health Ordinance

New York State Uniform Fire Prevention and Building Code

New York State Department of Conservation Chemical Bulk Storage Tank regulations 6NYCRR Parts 595-599

B. Above references do not relieve the Contractor from compliance with other applicable provisions of the codes, regulations and standards not specifically referenced.

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

D. 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)

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SECTION 01150

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 DESCRIPTION

A. The items listed below beginning with Article 1.03 refer to and are the same pay items listed in the Bid Schedule. They constitute all of the pay items for the completion of the work. No direct or separate payment will be made for providing miscellaneous temporary or accessory works, plant services, Contractors or Engineers field offices, layout surveys, job signs, sanitary requirements, testing, safety devices, shop and record drawings, water supplies, power, maintain traffic, removal of waste, watchmen, bonds, insurance and all other requirements of the Agreement, General Conditions and the Special Conditions. Compensation for all such services, things and materials shall be included in the prices stipulated for the lump sum and unit pay items listed herein. Unless otherwise specified, no separate payment will be made for stored equipment.

1.02 RELATED PROVISIONS SPECIFIED ELSEWHERE

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

1.03 CONTRACT NO. S3P312 – 07G – GENERAL CONSTRUCTION

A. General Construction Contract: Payment for Contract Item No. 1 shall be the lump sum bid under this item and will be full compensation for furnishing all labor, materials and equipment as required to complete the "Central Homes Pump Station Force Main Replacement" as described in Section 01010 – Summary of Work as shown on the Contract Drawings and specified under Divisions 1 through 16.

1.04 ALLOWANCES

A. Allowance items are described in the Proposal Section and in Section 01020. The total cost for these items shall be included in the total bid price.

1.05 UNIT PRICE CONTRACT ITEMS

A. The unit price Contract Items identified below shall be included in the total bid for each of the respective Contracts. The Contractor shall write the proposed unit costs for each item and calculate the bid price bases on the estimated quantity included in the Bid Form.

B. Payments will be made as stated in the General Conditions. Any unexpected balances of Unit Cost Items at project closeout will be credited to the Owner.

C. Contract Item No. 4 - Additional Authorized Excavation:
   1. Description:
      a. Under Contract Item No. 4, the Contractor shall perform additional authorized excavation which may be required beyond that shown on the Contract Drawings,

specified or required under Contract Item No. 1, and as ordered in writing by the Engineer.

1) The excavation shall be provided in accordance with the requirements of Specification Section 02316.

b. Measurement for Payment:
   1) The quantity of additional excavation measured for payment under this contract item will be the actual cubic yards of additional excavation provided as ordered in writing by the Engineer.
   2) Unauthorized additional excavation will not be measured for payment.
c. Payment:
   1) Payment for additional excavation ordered in writing, will be made at the Contract unit price bid per cubic yard for Contract Item No. 4.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01261

REQUESTS FOR INFORMATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: General procedures for Contractors' requests for information (RFI's) during the construction phase of the project.

1.02 DEFINITIONS

A. Request for Information (RFI): A written question related to the meaning or intent of the construction documents submitted to the Engineer during construction that may result in a change order.

B. Prime Contractor: A contractor who has been awarded one or more of the contracts included in a project.

1.03 ELECTRONIC RFI DELIVERY

A. RFI's will be processed and delivered electronically through a web based collaborative project management system.

1.04 HANDLING OF RFI'S DURING CONSTRUCTION

A. RFI's shall be submitted by Prime Contractors to the On-Site Representative on the provided RFI Form.

B. The On-Site Representative shall inform the Engineer of all field-addressed RFI's by submission of the completed RFI form.

C. The On-Site Representative will distribute RFI's to the Engineer.

D. Engineer will provide timely review of requests for information. Allow sufficient time for review and response.

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SECTION 01271

MILESTONES, LIQUIDATED DAMAGES AND SCHEDULING CONSTRAINTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. This section addresses Milestone Items, assessments of liquidated damages and scheduling constraints for timely completion of the work.

1.02 TIMELY COMPLETION

A. The Contractor's Time for Completion, in consecutive calendar days, for each of the Milestone Items is listed in Article 1.05. Time is of the essence to meet the Milestone Items set forth in Article 1.07. To encourage timely completion, the Owner is providing liquidated damages for each of the Milestone Items set forth in Article 1.05. Liquidated damages will be assessed as provided in Articles 1.03 through 1.05 below, and as described in the General and Supplementary Conditions.

1.03 LIQUIDATED DAMAGES

A. Liquidated damages will be assessed individually against the Contractor as set forth herein should the actual time for completion of the corresponding Milestone Items fail to occur within the scheduled Time for Completion of the Milestone. Liquidated damages will be assessed against the Contractor for those days which the Contractor is deemed responsible for the Milestone Item not being completed within the Time for Completion listed in Article 1.05.

B. The Owner may, in the exercise of his/her sole and absolute discretion, find that the work specified under the appropriate Milestone Item would have received a determination of completion prior to the actual Time of Completion and that receipt of such determination of completion was precluded by actions by the Owner. The amount of the liquidated damages would be calculated to the day on which the Owner finds the work would have otherwise been entitled to receive a determination of completion.

C. The amount of liquidated damages will be determined as follows: the liquidated damages value stated in Article 1.05 multiplied by the number of consecutive calendar days that the date for completion of the Milestone Items occurs after the Time for Completion.

D. In the event liquidated damages are assessed, the Owner will deduct and retain out of the monies which may become due under this Contract, the amount of any liquidated damages assessment. If such amount due under the Contract shall be less than the liquidated damages assessment, the Contractor shall be liable to pay the difference upon demand by the Owner. Liquidated damages for failure to complete a milestone item within the scheduled Time for Completion shall be assessed even should the Contractor abandon the work.

1.04 DETERMINATION OF LIQUIDATED DAMAGES

A. The determination of liquidated damages assessment will be made solely by the Owner, and his/her decision with respect thereto shall be accepted as final, binding, and conclusive.

B. For the purpose of calculating the number of calendar days for liquidated damages assessment, such calculation shall include the day on which the Contractor has successfully completed the work under the appropriate Milestone Item, but shall not include the day of scheduled completion.

C. For the purpose of determining the Time for Completion, the start date for each milestone shall be as indicated in Article 1.05.

1.05 LIQUIDATED DAMAGE VALUES

A. Liquidated Damage values for each Milestone Item are as follows:

Milestone	**Time for Completion (CCD)**	**Liquidated Damages $/Day**
1	90 days from Notice to Proceed	$1,000
2	60 days from completion of milestone 1	$1,000

B. There will be no limit to the amount of liquidated damages which may be assessed for the failure to achieve each milestone.

C. The Owner, in the exercise of his/her sole absolute discretion, may reduce assessments of liquidated damages for milestones not achieved by a Contractor if later Milestone dates are achieved.

1.06 CONSTRAINTS

A. Maintenance of plant operations, constraints, restrictions, are described in Specification 01700 – Maintenance of Plant Operations.

1.07 MILESTONE ITEMS

A. Milestone Items for which liquidated damages will be assessed are as follows.
   1. MILESTONE 1

a. The following project elements must be complete within 90 days of the Notice to Proceed:
    1) Contractor shall commence HDD activities for installation of new force main.

2. MILESTONE 2
    a. The following project elements must be complete within 60 days of the completion of Milestone 1:
        1) Contractor shall complete installation of new force main. This includes installation of the pipe, satisfactory pressure testing, and making the connections of the new force main to the Central Homes Pump Station and the terminal manhole on Forest Avenue.

PART 2 PRODUCTS (SECTION NOT USED)

PART 3 EXECUTION (SECTION NOT USED)

END OF SECTION

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SECTION 01300

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 DESCRIPTION OF REQUIREMENTS

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 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 County for independent inspection and testing, as applicable to the work.
   2. Submittal of Samples shall conform to the requirements of the General Conditions, Article GC-15, "Samples" and to procedures described in this Section.

1.03 MATERIAL SAFETY DATA SHEETS (MSDS)

A. Comply with “Right to Know” requirements of Chapter 551 of Laws of New York 1980 concerning notification of the use of toxic substances.

B. Any product or substance used by the Contractor or its subcontractors which is listed in Subpart Z of OSHA Part 1910 Title 29 of the Code of Federal Regulations entitled, “Toxic and Hazardous Substances” shall be identified to the County/Engineer by the Contractor’s submission of a standard MSDS.

1.04 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: "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." Shop drawings and product data sheets 11-in x 17-in and smaller shall be bound together in an orderly fashion and bear the above Certification Statement on the cover sheet.

C. 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.

D. Shop drawing submittals for each specification section should not be broken out into numerous submittals unless approved or requested by the Engineer.

E. 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

F. 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.

G. 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.

H. 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 County will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

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

1.05 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 1.07 below
   2. Product Data: See Article 1.07 below

D. Samples: Submit the number stated in the respective Sections.

E. 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.
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.

1.06 ELECTRONIC DATA SUBMITTAL FORMAT

A. Files shall be electronically searchable based on County 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:
1. PDF (Portable Document Format): .pdf, Adobe PDF documents; created through electronic conversion rather than optically scanned whenever possible.

1.07 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 County 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.

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.

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.

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.

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.

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.

Code 6 - "COMMENTS ATTACHED" is assigned where there are comments attached to the returned submittal which provide additional data to aid the Contractor.

Code 7 - “SUBMITTED FOR THE RECORD” is assigned when the contractor has submitted information for record purposes.

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 specific comment made by the Engineer on the previous submission otherwise the submittal will be returned as “Not Approved”. Additionally, the Contractor shall direct specific attention to any revisions made other than the corrections requested by the Engineer on previous submissions. Resubmittals must include all information from previous submittals for a complete submittal package.

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 two times at the County's and Engineer's expense. All subsequent reviews will be performed at times convenient to the County and Engineer and at the Contractor's expense, based on the County's and Engineer's then prevailing rates. The Contractor shall reimburse the County and Engineer for all such fees invoiced to the County 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.

1.08 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.

1.09 MOCK UPS

A. Mock Up units as specified in individual Sections, include but are not necessarily limited to, complete units of the standard of acceptance for that type of work to be used on the project. Remove at the completion of the work or when directed.

1.10 CONSTRUCTION PHOTOGRAPHS

A. Requirements for job photographs are provided in Article GC-37 of the General Conditions.

1.11 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.

1.12 CERTIFICATIONS

A. Submit certifications of compliance indicated in the Contract Documents. Certifications shall be complete and exact, they shall be properly authenticated by written signature, in ink of an owner, officer or duly authorized representative of the person, form or organization issuing such certification and they shall guarantee that the materials or equipment are in complete conformance with the requirements of these specifications.

1.13 TEST RESULTS AND INSTALLATION

A. Whenever a field startup services are specified, the Contractor shall obtain for the manufacturer and submit to the Engineer Manufacturer Startup Startup Services (MSR'S). The report shall detail the results of the field visit and all special conditions resulting from the startup.

B. Whenever field or factory tests are required on materials, equipment and systems tests shall be performed and the test results submitted to the Engineer in the form of a MSR. Do not deliver to the project or incorporate into the work any materials or equipment for which Engineer has not completed his review and found same to be in general conformance with the Contact Documents.

1.14 ADDITIONAL SUBMITTAL REQUIREMENTS

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

1.15 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

P.E. 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

_____ to design
(Name of Contractor)

_____
(Insert P.E. Responsibilities)

in accordance with Section _____ for the

Central Homes Pump Station Force Main Replacement
(Name of Project)

The undersigned further certifies that he/she has performed the design of the Central Homes Pump Station Force Main Replacement, 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

END OF SECTION

SECTION 01311

CONSTRUCTION SCHEDULING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: General requirements for construction schedule and reporting progress.

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

1.02 ORDER OF WORK

A. Commence work promptly and continue at locations, in order, and at times most expedient to completion of Work. Perform work with safety during all stages of construction, and complete in accordance with schedule. Owner reserves right to direct that certain portions of work be commenced and completed before work on other portions is started.

1.03 CHART FORM CONSTRUCTION SCHEDULE

A. Within 14 days after issuance of the Notice To Proceed, prepare and submit to Engineer for review, a schedule showing the order proposed to carry on the work and dates proposed to start and complete each salient feature, including dates for procurement of materials and equipment and schedule for submission of Shop Drawings. The schedule shall show in detail the proposed sequence of the Work and the estimated date of starting and completing each stage of the Work in order to complete the Project within the Contract time. If required, the schedule shall be revised until the Owner and Engineer approve it. Contractor shall coordinate their work schedule to cause the least interference to the Owner's operations. The Contractor must get the Owner's written authorization at least one week in advance of any work that will interfere with the public.

B. The Schedule must be used by the Contractor to report progress to the Owner and Engineer. Coordinate the Construction Progress Schedule a list of subcontracts, submittal schedule, progress reports, and payment requests.

C. At the preconstruction job conference, be prepared to discuss key elements of the construction schedule.

D. Prepare schedule of work in chart form showing contemplated completion percentages and arranged to record actual completion percentages at stated intervals.

E. It is responsibility of Contractor to obtain periodic schedule updates from other subcontractors and to maintain a current Project chart form schedule at all times.

F. Keep schedule of work up to date, and submit current updated schedule to Engineer monthly.

G. Schedule of Work determines the order in which work is to proceed. Engineer, however, may order and authorize minor changes to schedule when such changes are of advantage to Owner.

H. Furnish sufficient forces, construction equipment and plant as necessary to ensure the prosecution and completion of work in accordance with submitted schedule. Increase forces and request from Engineer an increase in working hours if falling behind progress shown on schedule. If, in opinion of Engineer, such increases are necessary for completion of work in accordance with terms of Contract, they will be approved. Failure to comply with requirements of Engineer may be grounds for determination by Engineer that Contractor is not proceeding at such rates as will ensure completion within specified time and may result in declaring Contractor to be in default.

1.04 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 ten (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.

PART 2 PRODUCTS – (NOT USED)

PART 3 EXECUTION – (NOT USED)

END OF SECTION

SECTION 01312

PROJECT MEETINGS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: General requirements for scheduling and attending project meetings.

1.02 PRECONSTRUCTION MEETING

A. A preconstruction meeting to discuss various contract related topics will be held after the Award of Contract but prior to starting work at the site at a location, date and time selected by the Owner. Participants shall include the Owner, Engineer and Contractors including site superintendents.

B. Engineer will prepare meeting agenda and documentation of meeting minutes and distribute copies to all meeting participants.

1.03 PROGRESS MEETINGS

A. Progress meetings will be held at bi-weekly intervals during the project with the Owner, Engineer and Contractor. Subcontractors and equipment suppliers shall attend when requested by the Owner or Engineer at no cost to the Owner.

B. Progress meetings at a minimum will include:
   1. Review and approval of minutes of previous meetings
   2. Review of work progress since previous meeting
   3. Plan work progress during next work period
   4. Field Observation, problems, conflicts and proposed remedies
   5. Review status of off-site fabrication and delivery schedule
   6. Review shop drawings and submittal schedules
   7. Review change order status
   8. Review construction schedule
   9. Public outreach coordination status
   10. Utility coordination status
   11. Other business related to the work

C. Meeting Representation:
   1. Contractor, major Subcontractors and other contractors are to provide representation at meetings by a person or persons vested with authority to make necessary decisions on behalf of Contractor, Subcontractors and other contractors, and commit Contractors to agreed procedures, sequence of operations and time schedules.
   2. Failure to be represented at meetings will subject absent Contractor to liability for damages, delays, costs of alterations, which may result from no representation to coordinate his work with work that was scheduled, arrangements agreed upon, or procedures developed at meeting (or meetings) in question.
   3. It is emphasized that above requirement will be strictly enforced by Owner and an offending Contractor held to strict accountability for failure to attend and effectively participate in Progress Meetings.

D. Where procedures, sequence of operations, time schedules and other matters have been agreed upon by each party concerned, it shall become binding upon each party to follow and comply with said procedures, sequence of operations, time schedules, and other matters, both as to time and performance, and no claim of delay or damages by the Contractor if he fails to comply therewith will be entertained by the Owner.

E. Contractor shall submit to the Engineer two days before the meeting a summary of work conducted during the previous period and work projected for the next period.

F. Engineer will prepare documentation of meeting minutes and distribute copies to Contractors and Subcontractors attending meeting.

1.04 OTHER MEETINGS

A. In addition to regularly scheduled meetings the Contractor shall attend special meetings which may be required or requested by Federal, State or Local authorities, utility companies, Owner, Engineer or any other firm, person or organization related to the project.

B. The Engineer will give to each party written notice of the location, date, time and agenda of each such scheduled meeting.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01342

SAMPLES

PART 1 GENERAL

1.01 GENERAL

A. Submittal of Samples shall conform to the requirements of the General Conditions, Article GC 15, "Samples" and to procedures described in this Section.

B. Samples and Shop Drawings which are related to the same unit of Work or Specification Section shall be submitted at the same time. If related, Shop Drawings and Samples are submitted at different times, they cannot be reviewed until both are furnished to the Engineer.

1.02 PROCEDURE

A. Submission of Samples shall conform to all applicable provisions under Shop Drawing Submittal and Correspondence Procedure.

PART 2 PRODUCTS – (NOT USED)

PART 3 EXECUTION – (NOT USED)

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SECTION 01355

HAZARDOUS MATERIALS CONTROL

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 Sections
   1. Section 01356, 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 a 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 testing and shall be at a site permitted to accept such waste by the Environmental Protection Agency (EPA) or an authorized state or local government agency. The Contractor shall provide remediation waste profiles for County signature as generator, permit documentation required for the selected Transportation, Storage and Disposal Facility (TSDF) to receive these wastes, and the transporter's Part 364 Waste Transporter Permit(s) required to transport wastes to the TSDF. The Contractor shall also provide advance copies of the waste manifest(s) for the Engineer's review and approval. 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 selected TSDF's will accept or have accepted the wastes generated during remediation. The Contractor shall also submit copies of the completed manifest, signed and dated by the initial transporter, in accordance with Federal and State requirements and with associated documentation (e.g., Waste Profile and Hazardous Waste Land Disposal Restrictions (LDR) Notification and Certification Form). Copies of completed and signed waste manifests from TSDF's shall be provided to the Engineer within seven (7) days of waste shipment offsite.

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 2.01.C through 2.01.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 immediate 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 particular 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.

PART 3 EXECUTION

3.01 HAZARDOUS MATERIALS

A. 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.

B. 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.

3.02 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. Where applicable, portable lights used outside in the path of possible vapor travel 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 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 is capable of entering 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 the course of 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 toilet facilities.

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 01356

SAFE AND HEALTHFUL WORKING CONDITIONS

PART 1 GENERAL

1.01 DESCRIPTION

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

B. Related Sections
   1. Section 01355, Hazardous Materials Control

1.02 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.

1.03 DEFINITIONS

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

1.04 SPECIAL CONDITIONS

A. In prosecuting the work of this Contract, the Contractor shall 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. All work shall also be performed 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. The Contractor shall 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. The Contractor shall 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.

1.05 SUBMITTALS

A. The Contractor shall submit a Health and Safety Plan (HASP) as described in Section 01355, Hazardous Materials Control.

B. Within 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.

1.06 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 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 01355, Hazardous Materials Control.

2.02 ACCIDENT REPORTS

A. The Contractor shall 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 Workmen'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 01356-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 01356-A, Hot Work Permit.

END OF SECTION

Nassau County Sewage Treatment Plant
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	PAI Signature	Date/Time	Acceptable		Final Insp./ Initials	Comments
			Yes	No		
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 hr?

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SECTION 01370

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 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 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 01400

PROTECTION OF UTILITIES

PART 1 GENERAL

1.01 WORK 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 or conduit, 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 plant, the Owners 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, 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 in his 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 UTILITY COORDINATION

A. Each Contractor shall give notice in writing to all utility and other companies or individuals owning or controlling any pipes, conduits, tracks or other structures which shall be found within one (1) foot of ordered excavation or otherwise be in interference so that said companies or individuals may remove their structures at their expense and the Contractor shall not cause any hindrance to or interference with such companies or individuals in removing their structures. However, if said utility, railroad, or other companies or individuals, within sixty (60) days after receipt of such notice shall fail to remove their structures, the Contractor shall, upon the written approval from Nassau County, remove the same, it being expressly understood that the cost thereof shall not be a charge against the County, but shall be a matter for adjustment between the Contractor and the company or companies or individuals concerned.

B. Comply with the provisions of 16 NYCRR Part 753 (also cited as Industrial Code 53 or Code Rule 53), including, but not limited to, the provisions of Subparts 753-3.1(a) and (b), which states that excavators shall notify the One Call Center at 1-800-272-4480 at least two (2) but not more than ten (10) working days, not including the date of the call, before the commencement of excavation.

C. The County shall not be liable for any costs incurred by the Contractor as a result of the compliance, noncompliance, or improper compliance by the franchised operators of underground facilities, with 16 NYCRR Part 753.

D. The County shall not be liable for any costs incurred by the Contractor for the support, protection, temporary removal, replacement and maintenance of underground facilities owned by franchised operators of such facilities.

E. The Contractor is advised that the provisions of 16 NYCRR Part 753 do not apply to County and/or Town owned utilities. It shall be the Contractor's responsibility to determine the location of the County and/or owned underground distribution systems. The Contractor shall make own field observations and research the County's and/or Town's records to determine the location of such facilities before the commencement of excavation.

F. The Contractor agrees to confer with and to make an offer to or entertain an offer from such private companies or individuals as own the said pipes, conduits, tracks or other structures, and the Contractor further agrees to enter into an agreement with said utility or other companies or individuals by what terms and at what prices the support, protection, maintenance, temporary removal and replacement of the pipes, conduits, tracks and other structures will be undertaken and accomplished and in the event of the failure to make such agreement with said companies or individuals the Contractor will not complain nor make any demand for additional compensation or pay for supporting, protecting, maintaining, temporarily removing and replacing the said pipes, conduits, tunnels, tracks or other structures.

G. It is understood that the cost of supporting, protecting, maintaining, temporarily removing and replacing the said pipes, conduits, tracks or other structures shall not be a charge against the

County, but shall be a matter of adjustment between the Contractor and the company or companies or individuals concerned.

H. The Contractor agrees to sustain in their places and protect from injury all railroad tracks, gas mains, conduits, and pneumatic pipes and all service connections therefrom and all other property belonging to public service companies along the line of the work and outside of the line of ordered excavation from direct or indirect injury by blasting, caving, or otherwise, and the Contractor hereby assumes all expenses for direct or indirect damage which may be occasioned by injury to any of them, and the Contractor agrees to have a sufficient quantity of timber and other necessary materials and appliances on hand at all times and use the same as required for the sheeting and bracing of sides and ends of excavation and for sustaining and supporting any structures that may be undermined, weakened and endangered or threatened; and in case any damage or injury shall result to said structure through or by reason of any negligence, willfulness, carelessness or want of skill on the part of the Contractor, the Contractor's agents or servants, the Contractor hereby agrees to pay such amount as shall be sufficient to cover the expenses and damages occasioned thereby, and that such amount shall be charged against the Contractor; and Nassau County is hereby authorized to deduct and retain from any moneys which may be due, or which shall become due under this contract, a sum sufficient in Nassau County's judgment to cover the cost of making good any such damages, expenses or loss, and to apply said sum so deducted and retained to the requisite repairs or renewals, or to reimburse the parties damaged or injured.

I. The Contractor agrees to support and to properly protect from injury the County and/or Town sewers and appurtenances and conduits or duct lines owned, controlled or operated by the County and/or Town which may be affected in any manner by the work done under this contract, except as hereinbefore provided, and to protect all such pipes from freezing. If the Contractor fails to do so, Nassau County shall be and is hereby authorized, after two (2) days written notice to the Contractor, to relay and recaulk and repair the same immediately, in each block, as the work progresses, and the cost thereof shall be charged to the Contractor, and the County hereby is authorized to retain and deduct said cost out of the monies which may be due or become due to the Contractor. In general, existing traffic signal and streetlighting conduits are not shown on the contract drawings. It is the Contractor's responsibility to determine the location of the traffic signal and streetlighting underground distribution system. The Contractor shall make own field observations and research the County's and/or Towns records to determine the location of such facilities. The cost of all support, protection and investigation performed by the Contractor as specified above shall be included in the prices bid for all the items for which there are contract prices, unless otherwise specified. Should it prove necessary to disturb existing traffic signals or streetlighting equipment that is the property of the County and/or Town, the Contractor shall provide temporary signals and streetlighting. Upon completion of the work, traffic signals, lamps, lampposts, and accessory equipment shall be restored, and temporary facilities shall be removed. Such work shall be accomplished in coordination with the County and/or Town and the appropriate utility companies. All costs for connections, disconnections, supply, erection, dismantlement, storage, and restoration of existing facilities shall be included in the prices bid for all contract items, unless otherwise specified. Should the Contractor disturb, damage, or relocate any conduits, junction boxes, traffic and/or lampposts, lamps or traffic signals in the streets affected by this work, such damage or relocation shall be immediately repaired with the knowledge of and to the satisfaction of the County. The cost of such work shall be at the sole expense of the Contractor, unless otherwise specified.

J. Comply with the utility coordination requirements contained in the General Conditions.

1.03 PUBLIC AND PRIVATE UTILITY MARKOUTS

A. The Contractor shall be required to provide utility markouts for all private and public utilities. The limits for these markouts shall be the project limit shown on the Contract Drawings. The Contractor shall submit the proposed utility subcontractor for approval.

B. Notify all public and private utilities in accordance with Article 20, Section 322-a of the New York State General Business Law for location and mark-out of existing utilities in the vicinity of the work.

C. Repair all utilities damaged during the Work to the standards and approval of the respective utility at no cost to the Owner.

D. No separate payment for the items "Protection of Utilities" will be made. The costs of same shall be included in the lump sum bid.

PART 2 PRODUCTS - (NOT USED)

PART 3 EXECUTION - (NOT USED)

END OF SECTION

SECTION 01410

JOB PHOTOGRAPHS AND VIDEO

PART 1 GENERAL

1.01 SECTION INCLUDES

A. The work specified in this section includes requirements for job photographs and videos.

1.02 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01330 photographs and videos to establish compliance with this section.

B. Names of the photographer and videographer companies proposed to satisfy the specification requirements within 30 days of the Notice to Proceed.

C. Photographs
   1. Digital photographs shall be provided.
      a. Photographs shall be:
         1) 10 Mega Pixels (10MP) or greater.
         2) Saved in .JPG (JPEG) file format.
      b. Photo metadata shall be intact and available.
   2. Submit for approval a folder structure in which the digital photographs will be stored.
      a. Folder structure shall remain the same throughout the project.
      b. The root folder shall contain the project name and project number.
      c. Subfolders shall be created for each building and/or superstructure photographed.
         1) Photos taken of, or within each building or superstructure shall be uploaded to its corresponding subfolder.
      d. Photos shall be sequentially numbered, and date included.
   3. Submit for approval a plot plan indicating locations of buildings and superstructures to be photographed.
      a. Buildings and superstructure names on the plot plan shall correspond to Subfolder names.
   4. Digital photographs shall be labeled with the following information:
      a. Project name
      b. Contract number and description
      c. Photograph number/identification
      d. Description of photograph location
      e. Date and time of photograph
      f. Photograph general description/caption
   5. Electronic photographs shall be supplied by FTP site or USB drive submitted to the Engineer for approval

D. Video
   1. Submit the pre-construction video on USB drive to the engineer for approval prior to construction. USB drive shall be labeled with the Project Name, Pre-Construction Video and date taken.

PART 2 PRODUCTS

2.01 PHOTOGRAPHS

A. General
   1. The Contractor shall engage the services of qualified, established commercial photographer acceptable to the Engineer to take color job photographs. The photographer will be required to take pre-construction, construction and post-construction photographs of the site of work as directed by Engineer.
   2. The Engineer reserves 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 Specification.

B. Pre-Construction
   1. The photographer, when directed by the Engineer shall visit the site prior to start of construction to take a total of 500 photographs showing existing conditions of the entire project site and any adjacent area which could be disturbed during construction.

C. Construction
   1. The photographer in the presence of the Engineer shall visit the site monthly or when directed by the Engineer during construction to take construction progress photographs. A total of 600 photographs shall be taken during the construction of the project exclusive of pre and post construction.

D. Post - Construction
   1. The photographer, when directed by the Engineer, shall visit the site at the completion of construction to take a total of 500 photographs showing the completed work, the entire project site and any adjacent areas which were disturbed during construction.

2.02 VIDEOS

A. General
   1. The Contractor shall engage the services of a qualified professional videotaping firm to perform videotaping of the proposed construction areas prior to the commencement of work.
   2. All video recordings must be by electronic means, display continuously and simultaneously generated transparent digital information to include the date and time of recording and audio describing the items being videotaped.

B. Pre-Construction
   1. The videographer, when directed by the Engineer shall visit the site prior to start of construction to video existing conditions of the entire project site and any adjacent area which could be disturbed during construction.

PART 3 EXECUTION

3.01 MEASUREMENT AND PAYMENT

A. No separate payment for this section will be made; the costs shall be included in the lump sum bid..

3.02 USE OF PHOTOGRAPHS

A. All photographs and negatives resulting from the work under this Contract shall become the property of the Owner upon their approval by the Engineer and may be used in whole or in part and in such manner or for such purpose as the Owner may desire.

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SECTION 01495

SPILL PREVENTION AND CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:
   1. 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. A Spill Prevention and Control Plan shall be provided to the Engineer.

1.03 GENERAL REQUIREMENTS

A. The Contractor shall 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. A Project Telephone Directory shall be incorporated into 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 a 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, the Contractor shall 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. The Contractor shall notify the New York State Department of Environmental Conversation, 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 an maintained by the Contractor as necessary to assure proper operation in time of emergency.

END OF SECTION

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SECTION 01500

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. Temporary facilities and controls shall be provided in the manner designated hereinafter. These temporary facilities will be provided at the Central Homes Force Main Replacement project.

B. Contractor shall coordinate and install all 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 County, the temporary facilities and controls shall be removed and the facilities restored to their original conditions by the Contractor.

D. Costs in connection with the temporary water, electric, lighting, heating ventilation, odor control 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 FACILTIES

A. The Contractor shall provide and pay all costs for sanitary facilities, fire protection, Contractor's field offices, and for cleaning by all Contractors, Subcontractors and their workmen. The Contractor shall make all arrangements with the County for connection and use of potable water from the Central Homes Pump Station for purposes of supplying the work area. The Contractor shall provide and install a temporary water pipe system from this location as required for the execution of the work. The temporary water pipe system shall be installed, buried at all roadway crossings.

B. The Contractor is responsible for his own bottled water needs.

C. The Contractor shall furnish and install a complete piping system for use of temporary water. The Contractor and Subcontractors shall provide their own hoses, valves and containers as required to service their own work force. The Contractor shall inspect the work area and assess the existing conditions. The cost for designing and installing a temporary water system shall be included within the lump sum price.

D. In the event that the Contractor requires more potable water than is available at the Central Homes pump station, then the Contractor shall pay all costs for obtaining and providing the additional water from the local water company.

E. Contractor shall protect the temporary water pipe system from freezing by heat-tracing above ground piping and installing buried pipes at a minimum depth of 4 feet. The system shall be extended and relocated as necessary to meet construction procedures and temporary water requirements.

1.03 TEMPORARY SANITARY FACILITIES

A. Contractor shall provide and pay all costs for temporary toilet facilities in sufficient numbers, for all Contractors' 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 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. County sanitary facilities and locker rooms are prohibited from Contractors' and Subcontractors' use.

1.04 TEMPORARY ELECTRICAL FACILITIES

A. The Contractor shall furnish and install a temporary electrical facilities system which shall consist of a new temporary electric service point, relocation of an existing temporary electric service point, a temporary general lighting system, a security lighting system, a safety lighting system, and service the Contractor's field office. The Contractor shall inspect the site and assess the existing conditions. The cost for designing and installing a temporary electrical system shall be included in the lump sum price.to the Contractor's field offices as outlined below.

B. Contractors' Field Offices:
   1. The Contractor shall extend the temporary electric service to the Contractor's field office.
   2. The Contractor shall be responsible for providing his own telephone and internet facilities as required.

C. Additional Facilities:
   1. Should any portion of any Contractor's work require light or power, he shall furnish, install and maintain such additional temporary lighting and power facilities at his 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 his contract, the Contractor responsible shall remove all additional facilities installed by him.

1.05 MAINTENANCE OF ELECTRIC POWER TO EXISTING FACILITIES

A. The Contractor shall be responsible for maintaining electric power to existing facilities at all times throughout the duration of the contract.

1.06 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 times.

B. Contractor shall provide and pay for all electric wiring and electrical accessories required for the temporary heating system. All electrical work required shall comply with the NEC.

C. Temporary heating equipment shall not be located so as 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.

1.07 TEMPORARY VENTILATION FACILITIES

A. Temporary construction ventilation shall be provided by the Contractor for the protection of his equipment, Work and his employee’s comfort and safety at all times.

1.08 PROTECTION OF WORK AND MATERIALS

A. Protection Requirements:
   1. During the progress of the Work and up to the date of Final Payment, each Contractor shall be solely responsible for the care and protection of all Work and materials covered by the Contract. In order 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 at all times 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.
      f. Workers shall use spark (explosion) proof tools in all Class 1, Division 1, Group D locations.
   2. The Contractor shall protect the existing Work and material from damage by his workmen and shall be responsible for repairing any such damage at no additional cost to the County.
   3. The Contractor shall 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 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, in order 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 Engineer and replaced by a specimen of equal or better quality.
g. Coordinate Work in this Section with requirements of Sections 02200, "Earthwork."

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 construction Work of this Project, 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. Each Contractor in his particular area of Work shall maintain egress as hereinbefore specified.
3. In active process areas, each 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. 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 Engineer except water, sewer, electric and telephone service are shown on the Drawings. This information is shown for the assistance of Contractor in accordance with the best information available, but is not guaranteed to be correct or complete.
c. 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 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 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, Engineer will direct 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. 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 carefully and as required by the party owning or controlling such structure. Before proceeding with the Work of sustaining and supporting such structure, Contractor shall satisfy the Engineer that the methods and procedures to be used have been approved by the County.
    b. 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. Contractor shall be responsible for all damage and expense for direct or indirect injury caused by his Work to any structure. 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.

D. Protection of Installed Products:
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.

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

F. Special Protection of Machinery and Equipment
1. 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 County.

G. Emergency Repair Crews
1. In case the Contractor's operations disrupt pump station operations, at any time, he shall at his own cost immediately make all repairs or replacements and do all work necessary to restore the plant to operation to the satisfaction of the County. Such work shall progress continuously to completion on a 24-hour/day, 7-workday/week basis. The Contractor shall provide the services of emergency repair crews, available on call 24 hours per day.

1.09 ACCESS ROADS, PARKING, STORAGE AND WORK AREAS

A. Contractor's Staging Area:
   1. The Contractor's attention is directed to the fact that there may be limited land available within the Central Homes Pump Station site for staging. The Engineer and the County will designate in the field the exact limits of such areas the Contractor shall have for staging.
      a. It is each Contractor's responsibility to visit the site prior to bidding and determine if there will be adequate space for storage. Where a Contractor needs additional storage areas other than is available on site that Contractor shall arrange for and pay the costs associated with providing suitable material storage areas in the vicinity of the site.
      b. The Contractor is responsible for the security of such off-site area. Under no circumstances will the County or the Engineer be responsible for the security of property and equipment belonging to the Contractors or their employees.
   2. The Staging Area shall be drained so that no ponding of runoff water shall occur in the Staging Area or adjacent areas.
   3. 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. The Contractor shall provide electrical utilities in the Staging Area as specified in this specification.
   4. The Contractor shall maintain all sections of the staging area in a suitable manner, including the cutting of grass, weeding and preventing the accumulation of debris.
   5. At the completion of the project, the Contractor shall remove all debris not limited to gravel, grout, wood, etc., from the staging area off-site. The Contractor shall also 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. Work Areas:
   1. 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.

1.10 CONTRACTOR'S FIELD OFFICE

A. The Contractor shall furnish, equip, and maintain a field office for his use at the Site during the period of construction. Each Contractor shall provide his own telephone and internet 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 located in the designated Staging Area.

C. The Contractor shall provide a field office with the minimum facilities specified. Provide all required storage and work sheds.
   1. Field Office and Furnishings:
      a. Acceptable appearance, weather-proof building or trailer with lockable door.
      b. Telephone service.
      c. Internet service
      d. Potable water service and water cooler service
      e. Six protective helmets for visitor's use.
      f. Exterior identifying sign.
      g. Company sign no larger than 4 feet by 8 feet.

2. Remove office and sheds upon Final Acceptance unless otherwise approved by the Engineer.

1.11 SECURITY

A. It shall be the responsibility of the Contractor to make whatever provisions he deems 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 County'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 County for damage resulting from trespassing.

C. The Contractor shall repair all damage to the property of the County 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 County.

E. Security measures taken by the Contractor shall be at least equal to those usually provided by the County to protect his 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 be displayed at all times, as per Section 01356, Safe and Healthful Working Conditions, Paragraph 1.04.F.1.

PART 2 PRODUCTS – (NOT USED)

PART 3 EXECUTIONS – (NOT USED)

END OF SECTION

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SECTION 01560

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. 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 areas.
   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.

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 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.

1.08 HAZARDOUS MATERIALS CONTROL

A. Refer to section 01355, Hazards Materials Control.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01600

MATERIALS AND EQUIPMENT

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.

D. Buy American" Requirements of Financing Entity:
   1. The Project is financed by the New York State Environmental Facilities Corporation under the New York State Clean Water Revolving Fund. Contractor shall comply with requirements of the financing entity relative to the Project, including submitting all required documentation.
   2. Project financing is under the FY 2014 federal appropriations for the Clean Water State Revolving Fund (CWSRF). Comply with applicable requirements of the financing entity, including compliance with the FY 2014 CWSRF's "buy American" provisions.
   3. All the iron and steel products incorporated into the Work shall be produced in the United States, in accordance with the FY 2014 CWSRF provisions of H.R. 3547, "Consolidated Appropriations Act, 2014" (Appropriations Act), enacted on January 17, 2014.
   4. Under the Appropriations Act:
      a. "Iron and steel products" are defined as the following products made primarily of iron or steel: lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.
      b. The word, "steel" means an alloy that includes at least 50 percent iron, between 0.02 and two percent carbon, and may include other elements. Production in the United States of the iron or steel used in the Project requires that all manufacturing processes take place in the United States, except metallurgical processes involving refinement

of steel additives. This requirement does not apply to iron or steel used as components or subcomponents of manufactured goods used in the Project.

c. The words, "reasonably available quantity" mean that the quantity of iron, steel, or the relevant manufactured good is available or will be available at the time required on a schedule consistent with complying with the Contract Times and at the location place required, and in the proper form and quality as shown or indicated in the Contract Documents.

d. The words, "satisfactory quality" mean the quality of iron, steel, or the relevant manufactured good as shown or indicated in the Contract Documents.

5. Requirements for using United States iron and steel will not apply in any case or category of cases in which the Administrator of the U.S. Environmental Protection Agency (in this section referred to as the "Administrator") finds that:
   a. Applying the "buy American" provision for iron and steel would be inconsistent with the public interest
   b. Iron and steel products are not produced in the United States in sufficient and reasonably available quantities and of a satisfactory quality; or
   c. Inclusion of iron and steel products produced in the United States will increase the cost of the Project by more than 25 percent.
6. Contractor shall submit information verifying compliance with the buy American requirements, certification of compliance with the buy American requirements, and when required information necessary to support applying for a waiver of the buy American requirements, as required by the Owner or the financing entity, under the provisions of the Appropriations Act and related guidance by authorities having jurisdiction over such funds and use thereof.
7. Contractor shall pay damages incurred by Owner for Contractor's failure to comply with provisions of the financing entity's requirements, including "buy American" provisions. Notwithstanding other provisions of the Contract Documents, failure to comply with the buy American requirements allows Owner to recover as special damages against Contractor, and Contractor shall pay, costs for all claims, costs, losses, or damages (including but not limited to all fees and charges of engineers, architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) incurred by Owner resulting from such failure by Contractor, including without limitation impairment or loss of Project funding or financing, whether in whole or in part, from the financing entity, and damages incurred by Owner by Owner's obligations to the financing entity regarding Project funding or financing.

1.02 TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT

A. The Contractor shall make all arrangements for transportation, delivery and handling of equipment and materials required for prosecution and completion of the Work in accordance with Section 01610, Transportation and Handling of Materials and Equipment.

1.03 STORAGE OF EQUIPMENT AND MATERIALS

A. The Contractor shall store his 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. The Contractor shall not store materials or encroach upon private property without the written consent of the Owners of such private property.

1.04 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, including that of other Contracts, 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 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

SECTION 01610

TRANSPORTATION AND HANDLING OF MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 GENERAL

A. The Contractor shall 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 s-hall 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 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)

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SECTION 01660

QUALITY CONTROL

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.

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.
   2. When an item of equipment designated for testing in Contract Documents has been completely erected, including controls and instrumentation, notify Engineer, who will designate the time to make tests as required and described in Section 01812. All testing will be done in presence of Engineer and the item of equipment operated to satisfaction of Engineer.
      a. "Completely erected" means that installation is erected, all necessary adjustments have been made, all required utility connections have been made, required lubricants have been applied and following requirements have been met: O&M Manuals submitted, electrical system tests, spare parts lists and manufacturer's installation certificate submittals. Furnish labor, lubricants, and other materials, equipment and instruments necessary for required tests.
      b. Provide competent and experienced personnel representing manufacturer of equipment furnished and installed under this Contract, to assist in installation, adjustment, and testing of equipment in accordance with Contract Documents.

B. Payment Procedures:
   1. Wages and salaries of Contractor's personnel as required by any and all tests specified will be paid for by Contractor and included in lump sum bid.
   2. Include all treatment plant operating costs, as part of lump sum bid until satisfactory completion of Field Tests, or until facility is put into operation by County, whichever comes first.
   3. Operating Costs:

a. Operating costs are understood to include, but not be limited to the following costs for Field Tests:
   1) Electrical power.
   2) Water to provide flow for tests.
   3) Lubricating grease.
   4) Lubricating oils.
   5) Gas.
   6) Heating.
   7) Chemicals listed below for testing will be provided by the Contractor. All costs including delivery for chemicals will be paid by the Contractor.
      a) Sodium Hydroxide
      b) Sodium Hypochlorite
      c) Liquid Polymer
   8) Provide one (1) full truck delivery for each storage tank of the chemical and quantity as specified below after certified substantial completion:
      a) Sodium Hydroxide: One (1) 3,000 gallon delivery
      b) Sodium Hypochlorite: One (1) 3,000 gallon delivery
      c) Liquid Polymer: Two (2) 5,000 gallon deliveries
   9) Include costs for disposal of water used during tests and wastes resulting from tests in the applicable lump sum bid.
   10) Such other materials or utilities not specifically identified herein, but required to conduct the Field Tests.
   11) Electrical Power: The County will provide the electrical power for conducting the Fields Tests

C. Sequencing
   1. At least 30 days prior to proposed testing, submit in writing to Engineer a complete outline and sequence of proposed testing procedure including at least the following information:
      a. Name of equipment to be tested, including reference to specifications section number and title.
      b. Testing schedule of proposed dates and times for testing.
      c. Summary of power, lighting, chemical, water, sludge, gas, etc, needs and identification of who will provide them.
      d. Outline specific assignment of the responsibilities of the Contractor and manufacturers' factory representatives or field service personnel.
      e. Detailed description of step-by-step testing requirements, with reference to appropriate standardized testing procedures and laboratory analyses by established technical organizations (e.g., ASTM, WPCF Standard Methods, etc).
      f. Samples of forms to be used to collect and record test data and to present tabulated test results.
      g. List of related equipment, systems and instruments that are needed to be operational.
      h. Submit name, address and resume of proposed factory trained manufacturer's representative that will perform testing of equipment.
   2. No testing will begin until approval is given. Such approval is for general schedules of testing and in no way relieves responsibility for conducting test expeditiously and with adequate number of personnel to handle emergencies.

D. 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.

E. 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 start up and operation of the Project. Where this is not practicable, final field tests shall be performed during initial start up 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 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, minimum speed and various other operating speeds 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 Contractor shall provide all required temporary instruments including flowmeters. 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 start up 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.

F. Disposal
1. Dispose of all water used during tests and wastes resulting from tests. Method of disposing water and wastes will be in accordance with all applicable state regulations and is subject to approval by Engineer.

1.03 REPORTS

A. Certified Test Reports:
1. Certified test reports required by Contract Documents, will meet following requirements:
a. Before delivery of materials for which certified test reports are required, certified copies of reports of all tests required in referenced publications or specified within Contract Documents are to be submitted for approval to Engineer.
b. Testing is to be performed in an approved independent laboratory, within one year of submittal of reports for approval.
c. Submit with test reports a notarized certificate from manufacturer or supplier certifying tested material meets specified requirements and is of same type, quality, manufacture and make as that proposed to be supplied.

B. Installation Certificates:
1. Submit Installation Certificates for those items of equipment listed by Contract Documents using the form at the end of this Section.
2. Installation Certificates to state that equipment has been installed under either continuous or periodic supervision of manufacturer's authorized representative, that it has been adjusted and initially operated in presence of manufacturer's authorized representative and that it is operating in accordance with specified requirements to manufacturer's satisfaction.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

EQUIPMENT SUPPLIER'S CERTIFICATE OF INSTALLATION FORM

County:	Nassau County Department of Public Works
Project:	Central Homes Pump Station Force Main Replacement
Contract No.:	S3P312-13G
Equipment Specification Section:	
Equipment Description:	

I _____, Authorized representative of
(Print Name)

_____
(Manufacturers Name)

Hereby certify that_____
(Print equipment name and model number)

installed for the subject project has (have) been installed in a satisfactory manner, has (have) been tested and adjusted, and is (are) ready for final acceptance testing and operation on :

_____ _____
Date Time

CERTIFIED BY MANUFACTURES REPRESENTATIVE

_____ _____
Name Date

_____ _____
Signature Time

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SECTION 01700

MAINTENANCE OF PLANT OPERATIONS

PART 1 GENERAL

1.01 GENERAL

A. The intent of this Section is to have Contractor perform his Work in such a manner that continuous, uninterrupted treatment of the waste flows (air and water) and all essential Pump Station services and facilities are maintained operational throughout the construction period.

B. Except for the scheduled shutdowns specified in this Section and in other Contracts, the existing Central Homes Pump Station will be maintained in continuous operation by the County during the entire construction period under all Contracts. Work under this Contract shall be so scheduled and conducted by Contractor such that it will not impede any treatment process, create potential hazards to operating equipment and Pump Station Personnel, reduce the quality of the plant effluent or cause odor or other nuisance. In performing the Work shown and specified, Contractor shall plan and schedule Work to meet both constraints outlined in this Section and plant operating requirements.

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

D. Contractor has the option of providing additional temporary facilities that can eliminate a constraint, provided it is done without additional cost to the County, and provided that it does not require any other Contractor to perform additional work, and provided that all requirements of these Specifications are fulfilled.

E. The Contractor shall not shut off or disconnect any operating system of the Pump Station. All Pump Station equipment operation and equipment shutdowns shall be executed by the County. The Contractor shall put in place a Lock Out Tag Out (LOTO) system for the safety of their workers in conjunction with Pump Station's LOTO.

F. The Contractor should 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.

G. This Section of the Specifications contains several references to equipment, piping, material and appurtenances to be removed or reinstalled. The Contractor shall also 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 County and stored on site, or to become the property of the Contractor and removed from the site.

1.02 GENERAL CONSTRAINTS

A. Article 1.06 of this section specifies the sequence, detailed system constraints and shutdown duration (where applicable) for Pump Station units which are to be taken out of service. The

operational status of new or existing units other than the designated units shall not be interrupted by the Contractor during the specified time periods.

B. The following constraints shall be applied to all equipment and appurtenant utility systems on the Pump Station site.
   a. Access to Pump Station Site, Roadways, and Parking Areas
      1) An unobstructed traffic route through the plant main gate shall be maintained at all times for the County's operations personnel and maintenance equipment. Parking for personal vehicles of construction personnel shall not be allowed to pass thru the main gate but rather the designated areas shown on the Contract Drawings.
      2) An unobstructed traffic route around the pump station site shall be maintained at all times for the County's operations personnel and maintenance equipment. Vehicular access to the pump station for County personnel shall be maintained at all times by the Contractor.
      3) The Contractor shall provide temporary measures to protect the existing pavement by filling over with earthen material or supplying other measures acceptable to the Engineer, and he shall repair any damage to existing paved surfaces that occurs during the construction period. Any areas disturbed along the shoulders of the access road and interior roads and elsewhere inside and outside of the plant shall be repaired, graded, seeded, etc. as necessary to match pre-existing conditions.
   b. Personnel Access
      1) Pump station personnel shall have access to all areas which remain in operation throughout the construction period. The Contractor shall locate stored material, dispose of construction debris and trash, provide temporary walkways, provide temporary lighting, and other such work as directed by the Engineer to maintain personnel access to areas in operation. Access and existing parking areas for plant personnel must be maintained throughout construction.
   c. Plumbing Facilities
      1) Unless otherwise allowed by the Engineer, sanitary facilities in the existing structures shall be operational at all times for plant operating personnel. All other building plumbing systems such as roof and floor drains, pumping, etc., shall be maintained for all structures.
   d. Building Heating and Ventilating
      1) Building heating and ventilating for the existing pump station shall be in service for the entire construction period. Additional temporary heating and ventilation shall be provided as required to maintain facilities under construction adequately heated and vented. The temperatures to be maintained in any areas occupied by operating personnel such as offices, lunchrooms, locker rooms, bathrooms, etc., shall be at least 65°F. The temperatures to be maintained in all other interior areas, whether new, existing or temporary, shall be maintained at a minimum of 55°F.
   e. Power, Light and Communications Systems
      1) Electric power, lighting service and communications systems shall be maintained in uninterrupted operation in all areas which remain in operation.
   f. Draining Process Pipes and Conduits
      1) Unless otherwise specified, the contents of pipes and conduits undergoing modifications shall be transferred to the Pump Station drain system using hoses, piping or pumps if hydraulic conditions so require them by the Contractor whose work requires the draining.

2) If a drain is not available on the pipe to be drained, then a wet tap shall be made by the Contractor using an approved tapping saddle and valve. No uncontrolled spillage of pipe's contents shall be allowed.
3) All spillage shall be immediately washed down by the Contractor to the floor drains, sumps and sump pump discharge piping flushed out by the Contractor to prevent clogging and septic odors.

g. Potable Water System
1) Potable water service shall be maintained in continuous service at all times during construction except for short term interruptions required for tie-ins. Shutdown of the potable water system shall be fully planned and coordinated with the County and shall be limited to not more than two (2) hours. Existing fire hydrants within the pump station site shall be operational at all times, unless otherwise approved by the County.

h. Storm Drainage
1) Storm drainage on the site shall be operational at all times.

i. Sump Pumps and Sumps
1) All existing sumps shall be maintained in an operable condition with either existing pumps or temporary pumps provided by Contractor. Interim piping, power and controls shall be provided by Contractor as required by the construction sequence.

j. Dead End Valves and Pipes
1) The Contractor shall provide blind flanges on all valves or pipe that dead end a line on a temporary or permanent basis.

k. Lifting Equipment
1) The Contractor shall not be permitted to use the Pump Station's lifting equipment unless otherwise directed in writing by the County.

l. Temporary Partitions and Enclosures
1) The Contractor shall provide any temporary partitions and enclosures as shown or ordered by the Engineer necessary to maintain dust-free, heated and ventilated spaces in areas which are adjacent to his work and which must be kept operational by the County.

1.03 SHUTDOWNS

A. General
1. Shutdown shall be defined to indicate that a portion of the normal operation of a Pump Station unit has to be suspended or taken out of service in order to perform the specified work. For each shutdown, the Contractor shall compile an inventory of its 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 County for review 60 calendar days prior to the proposed start date of the shutdown. The Contractor shall also request in writing, from the County, approval for each shutdown a minimum of fourteen 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 Pump Station operations shall be accomplished at such times that will be convenient to the County.
3. The Contractor shall provide 7-day advance notice of needed shutdowns to the Engineer and all Pump Station and Operations staff.

4. The Contractor shall also 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 County shall be satisfied that the Contractor has complied with these requirements, to the fullest extent possible, before shutdowns will be authorized.

B. Shutdown of Electrical Systems:
   1. The Contractor and the County shall each lock out and tag circuit breakers and switches operated by the County and shall check cables and wires to be sure that they are de-energized to ground potential before work begins. Upon completion of the Work the Contractor shall remove the locks and tags and advise the County that the facilities are available for use. The County will then remove their locks and place facilities back into use. The Contractor shall not operate any existing electrical equipment without the approval, direction and supervision of the Engineer.

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.

B. The Contractor shall coordinate his work with the Contractors for the above projects/contracts as outlined in Article 7 of the General Conditions.
   1. For ongoing projects, contract documents may be available for inspection at County offices.
   2. For listed future projects and other (unlisted) that arise, the contract documents, when completed for bidding purposes will be available for purchase at County offices during the bid period.

1.05 MAINTENCE OF PLANT OPERATIONS (MOPO) AND SEQUENCE OF CONSTRUCTION

A. In order to maintain a continuous pump station 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 Pump Station.

B. Work not specifically covered in the detailed MOPO and sequence of construction operations descriptions may in general be done at any time during the Contract Period subject to the operating requirements outlined in this Section.

C. All references to days and hours in this Section are consecutive calendar days and hours.

D. Contractor is advised that work in multiple areas of the Pump Station performed simultaneously may be required in order to complete the entire scope of the Contract within the allotted time. Contractor is encouraged to perform concurrent work within the Constraints/Restrictions outlined.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PERFORMANCE

A. The means and methods of performing the work are the sole responsibility of the Contractor and are subject to the review of the Engineer and County.

DETAILED MOPO AND SEQUENCE OF CONSTRUCTION OPERATIONS DESCRIPTIONS

ITEM NO.	DESCRIPTION
1.0	CONNECT NEW FORCE MAIN

MAINTENANCE OF PLANT OPERATIONS

ITEM NO.1 – CONNECT NEW FORCE MAIN

Item No.	Description	Suggested Procedure	Constraints	Comments
1	Connect new force main to the existing force main and existing discharge manhole	1) Following installation and acceptable performance testing of the new force main, connect the new force main to the existing force main downstream of the existing pump station meter vault; connect to the existing discharge manhole on Forest Avenue. Place new force main into service and abandon existing force main.	• The pump station must be able to accept flow during the entire construction period during which the tie-ins are being made. • Temporary removal of sewage from the wet well during construction may only occur between the hours of 7:00 AM and 3:30 PM, Monday thru Friday. Outside of these hours the pump station must be able to operate normally. • The new force main must satisfactorily pass the required pressure testing prior to being placed into service.	• Contractor shall coordinate shutting down the wet well pumps with the County and provide a means for temporary removal of sewage from the wet well during this period. • Average daily flow from the pump station is 176,000 gallons per day.

END OF SECTION

SECTION 01710

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 01760, Project Closeout.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01720

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."

B. The Contractor will be furnished without charge by the Owner, one additional set of Contract Drawings in non-reproducible black and white prints. In addition, the Contractor will be provided access to electronic files in AutoCAD format for the Contractor's use in preparing Record Drawings.
   1. Electronic media made available is without guarantee of compatibility with the Contractor's software or hardware.
      a. The Contractor will be required to execute an indemnification and hold harmless agreement with the Engineer.
      b. Electronic media will be provided free of charge.

1.02 MAINTENANCE OF DOCUMENTS

A. Maintain at the site 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. 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 including two (2) bound Arch-D (24”x36”) plotted drawing sets, one compiled electronic set of Record Drawings; in Acrobat PDF Format; and, an electronic AutoCAD (release 2018 or later) file showing the actual in place installation of these items installed under this Contract. Provide two USB drives with the Acrobat PDF drawing set and electronic AutoCAD file. Drawings shall show the Work in plan and sections as required for clarity with reference dimensions and elevations for complete Record Drawings. Tracings shall be furnished not later than 30 days after completion of the Work and prior to Final Payment.
2. 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 drawing 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 under this Contract.
3. All Drawings must be submitted for approval of the Engineer. This shall include the following composite drawings for the system being furnished:
a. Conduit and cable schedules: These shall include all conduit and cable furnished under this Contract.
b. Dimension of outline drawings: These shall include all equipment furnished under this Contract.

B. Submittal:
1. 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 01760

PROJECT CLOSEOUT

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

SECTION 01770

MINORITY/WOMEN'S BUSINESS ENTERPRISE PROGRAM AND EQUAL EMPLOYMENT OPPORTUNITY REQUIREMENTS

1.01 GENERAL REQUIREMENTS

A. The Contractor shall comply with all federal, state, and local statutory and constitutional anti-discrimination provisions. In addition, Local law No. 14-2002, entitled "Participation by Minority Group Members and Women in Nassau County Contracts" governs all County Contracts. In accordance with Local law 14-2002:

a) The Contractor shall not discriminate against employees or applicants for employment because of race, creed, color, national origin, sex, age, disability or marital status in recruitment, employment, job assignments, promotions, upgradings, demotions, transfers, layoffs, terminations and rates of pay or other forms of compensation. The Contractor will undertake or continue existing programs related to recruitment, employment, job assignments, promotions, upgradings, transfers, and rates of pay or other forms of compensation to ensure that minority group members and women are afforded equal employment opportunities without discrimination.

b) At the request of the County contracting agency, the Contractor shall request each employment agency, labor union, or authorized representative of worker with which it has a collective bargaining or other agreement or understanding, to furnish a written statement that such employment agency, union, or representative will not discriminate on the basis of race, creed, color, national origin, sex, age, disability, or marital status and that such employment agency, labor union, or representative will affirmatively cooperate in the implementation of the Contractor's obligations herein.

c) The Contractor shall state, in all solicitations or advertisements for employees, that, in the performance of the County Contract, all qualified applicants will be afforded equal employment opportunities without discrimination because of race, creed, color, national origin, sex, age, disability or marital status.

d) The Contractor shall make its' best efforts to solicit active participation by "Certified business enterprises (as defined in Section 101 of Local law No. 14-2002).

e) The Contractor shall be bound by the provisions of Section 109 of Local law No. 14-2002 (entitled "Enforcement").

f) The Contractor shall include the provisions of (a) through (e) above in every subcontract providing for a total expenditure in excess of twenty-five thousand dollars ($25,000) for the construction, demolition, replacement, major repair, renovation, planning or design of real property and improvements thereon (the "Work"), except where the Work is for the beneficial use of the Contractor.

The provisions of (a) through (f) above do not apply to: (i) work, goods or services unrelated to the County Contract, or (ii) employment or employment related activities outside of the County.

The term "County Contract" means (i) a written agreement or purchase order instrument, providing for a total expenditure in excess of twenty-five thousand dollars ($25,000), whereby a County contracting agency is committed to expend or does expend funds in return for labor, services, supplies, equipment, materials or any combination of the foregoing, to be performed for, or rendered or furnished to the County; or (ii) a written agreement in excess of one hundred thousand dollars ($100,000), whereby a County contracting agency is committed to expend or docs expend funds for the acquisition, construction, demolition, replacement, major repair or renovation of real property and improvement thereon. However, the term "County Contract" does not include agreements or orders for the following services: banking services, insurance policies or contracts, or contracts with a County contracting agency for the sale of bonds, notes or other securities.

The term "Contractor" means an individual, business enterprise, including sole proprietorship, partnership, corporation, not-for-profit corporation, or any other person or entity other than the County, whether a contractor licensor, licensee or any other party, that is (i) a party to a County Contract, (ii) a bidder in connection with the award of a County Contract, or (iii) a proposed party to a County Contract.

END OF SECTION

SECTION 02082

MANHOLES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: The work specified in this Section consists of constructing precast concrete, cylindrical, manhole components and accessories.

B. All manholes, frames and covers shall comply with NCDPW standards.

C. Related Sections
1. Submittals: Section 01300
2. Transportation and Handling: Section 01610
3. Excavation: Section 02316
4. Cast-In-Place Concrete: Section 03300
5. Grouts: Section 03600

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):
1. AASHTO M-198, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
2. AASHTO Standards as referenced throughout these Specifications.

B. American Society for Testing and Materials.
1. ASTM A 48, Specification for Gray Iron Castings.
2. ASTM A240, Specification for Heat Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
3. ASTM A276, Specification for Stainless and Heat-Resisting Steel Bars and Shapes.
4. ASTM A307, Specification for Carbon Steel Externally Threaded Standard Fasteners.
5. ASTM A615, Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
6. ASTM C144, Specification for Aggregate for Masonry Mortar.
7. ASTM C150, Specification for Portland Cement.
8. ASTM C207, Specification for Hydrated Lime for Masonry Purposes.
9. ASTM C270, Specification for Mortar for Unit Masonry.
10. ASTM C478, Specification for Precast Reinforced Concrete Manhole Sections.
11. ASTM C497, Standard Methods of Testing Concrete Pipe, Manhole Sections, or Tile.
12. ASTM C923, Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.
13. ASTM C990, Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants.
14. ASTM D412; Standard Test Methods for Rubber Properties in Tension.
15. ASTM D518; Standard Test Method for Rubber Deterioration - Surface Cracking.
16. ASTM D573; Standard Test Method for Rubber - Deterioration in an Air Oven.
17. ASTM D624; Standard Test Method for Rubber Property - Tear Resistance.

18. ASTM D695, Test Method for Compressive Properties of Rigid Plastics.
19. ASTM D2000, Standard Classification System for Rubber Products in Automotive Applications.
20. ASTM D2137; Standard Test Method for Rubber Property - Brittleness Point of Flexible Polymers and Coated Fabrics.
21. ASTM D2240, Test Method for Rubber Property-Durometer Hardness.
22. ASTM D3676; Standard Specification for Rubber Cellular Cushion Used for Carpet or Rug Underlay.
23. ASTM D4101, Specification for Propylene Plastic Injection and Extrusion Materials.
24. ASTM F593, Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs.
25. ASTM F594, Specification for Stainless Steel Nuts.

C. American Water Works Association:
   1. AWWA C302, AWWA Standard for Reinforced Concrete Water Pipe-Noncylinder Type, Not Prestressed.

1.03 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01330, shop drawings, product data, certified letters of compliance and information required to establish compliance with this section.

B. Shop Drawings and Product Data: Submit manufacturer's published detail drawings, modified to suit design conditions if required, catalog cuts and Contractor prepared drawings as applicable.

C. Certificates: Submit certified records or reports of results of shop tests with such records or reports containing a sworn statement that shop tests have been made as specified.
   1. Submit manufacturer's sworn certification that components and products will be manufactured in accordance with specified reference standards for components and products.

1.04 QUALITY ASSURANCE

A. Quality Control: Maintain uniform quality of products and component compatibility by using the products of one manufacturer for precast reinforced concrete manholes.

B. Certifications:
   1. Obtain certificate of materials and construction compliance with ASTM C478 from the precast reinforced concrete manhole manufacturer. Submit this certificate as part of required submittals.
   2. Obtain certificate of material and construction compliance with ASTM A48, Class 30 tensile strength from the manhole frame and cover manufacturer. Furnish certification that tensile test bars were from same pour as castings. Submit the certificate as part of required submittals.

1.05 DELIVERY, STORAGE AND HANDLING

A. General Requirements: As specified in Section 01610.

B. Delivery and Handling: Transport and handle precast reinforced concrete manhole components, and other products specified herein, in a manner recommended by their respective manufacturers to prevent damage and defects.
   1. Through-wall lifting holes are not permitted in manhole component construction.

C. Storage: Store precast reinforced concrete manhole components in accordance with their manufacturer's recommendations to prevent joint damage and contamination. Exercise such care in storage of other specified products as recommended by their respective manufacturers.

1.06 PROJECT/SITE CONDITIONS

A. Environmental Requirements:
   1. Do not set or construct manhole bases on subgrade containing frost.
   2. To improve workability of Preformed Plastic Sealing Compound during cold weather, store at temperature above 70 degrees F or artificially warm compound in a manner as recommended by manufacturer.
   3. During warm weather, stiffen Preformed Plastic Sealing Compound as recommended by the manufacturer.

PART 2 PRODUCTS

2.01 BASIC MATERIALS

A. Cast-In-Place Concrete Products: As specified in Section 03300.
   1. Use Class A (4,000 psi) quality concrete, unless indicated otherwise on the Drawings.

B. Non-Shrink Non-Metallic Grout: As specified in Section 03600.

C. Waterproofed Mortar: Conforming to requirements of ASTM C270 for Type M, 2500 psi. Parts by volume include: One part cement, 1/4 part lime, and sand at not less than 2-1/4 nor more than three times the sum of the volumes of cement and lime used and of the following materials:
   1. Waterproofing Agent: Medusa Waterproofing Powder by Medusa Portland Cement Co.; Hydratite by Grace Construction Materials; or Hydrolox by Chem-Master Corp. Add the Medusa product in the ratio of two pounds per bag of cement; add the other products per manufacturer's recommendations.
   2. Portland Cement: Conforming to ASTM C150, Type I.
   3. Hydrated Lime: Conforming to ASTM C207, Type S.
   4. Sand: Conforming to ASTM C144.
   5. Water: Clean and free from deleterious amounts of acids, alkalis, and organic materials.

D. Epoxy Bonding Compound: Provide a high-modulus, low viscosity, moisture insensitive epoxy adhesive having the following characteristics.
   1. Mix Ratio: 100 percent solids, two-component; mixed one part by volume component B to two parts by volume component A.
   2. Ultimate Compressive Strength: 13,000 psi after cure at 73 degrees F. and 50 percent relative humidity determined in accordance with ASTM D695.
   3. Acceptable Manufacturers:
      a. Sika Corporation: Sikadur Hi-Mod.
      b. Euclid Chemical Company; No. 452 Epoxy System.
      c. A. C. Horn, Inc.; Epoxtite Binder.

d. Or Approved Equal.

E. Manhole Steps: The Contractor is permitted the option to provide one type of manhole step in the Project as selected from the step types and designs below:
   1. Stainless Steel: In accordance with NCDPW requirements.
   2. Reinforced Plastic Step: Composed of a 1/2 inch Grade 60, ASTM A615 deformed steel reinforcing bar completely encapsulated in Grade 49108, ASTM D4101 polypropylene copolymer compound, Type II.
      a. Acceptable Manufacturers:
         1) M. A. Industries, Inc., Type PS2-B.
         2) Or Approved Equal.

F. Manhole Frame and Cover: Gray iron castings conforming to ASTM A48, Class No. 35B, designed for AASHTO Highway Loading Class H-20. Provide castings of uniform quality, free from blowholes, porosity, hard spots, shrinkage distortion or other defects. Frame and cover design and dimensions are as indicated on Drawings.
   1. Finish: Bearing surfaces machined to prevent rocking and rattling under traffic. Casting finished meeting AASHTO Specification M 306, 4.3.3. Painting, Welding, Plugging not allowed.
   2. Identification: Cast the applicable word "NC SEWER, or other as indicated on Drawings or required by Engineer, integrally on cover in two inch size raised letters.
   3. Frame Hold-down Bolts: Conforming to ASTM A307.
   4. Security Cover: Nassau County Type F Adjustable Manhole Cover
      a. See Construction Drawing Details
   5. Manufacturer: Campbell Foundry Co., Harrison, NJ Pattern No. 17341010 or approved equal.

G. Manhole Component (Section-to-Section) Seals: Provide manhole component seal in the Project as specified below:
   1. Preformed Plastic Sealing Compound: Flexible rope gasket of butyl rubber material meeting or exceeding all requirements of ASTM C990 and AASHTO M198, extruded in rectangular or square shapes and provided in rolls on coated release paper.
      a. Dimensions: Size the cross-section of rope form to provide squeeze-out of material around entire interior and exterior circumference of each manhole section joint when joint is completed.
      b. Acceptable Manufacturers:
         1) Concrete Sealants, Inc., ConSeal CS-102B.
         2) Hamilton Kent Manufacturing Company; KENT-SEAL NO. 2.
         3) Henry Company; RUB'R-NEK.

H. PVC Waterstop: Provide PVC waterstop for use on pipe entering manhole base where the manhole base is of cast-in-place construction.
   1. Material Composition: Gasket type waterstop composed of virgin polyvinyl chloride (PVC) material.
   2. Acceptable Manufacturers:
      a. FERNCO Inc., CMA Concrete Manhole Adapter.
      b. Or Approved Equal.

I. Sleeve Type Pipe Seal: Use sleeve type pipe seal in making a core-drilled connection of piping to existing manholes or structures. Pipe seal construction as follows:

1. In general, the pipe seal shall conform to the requirements of ASTM C923 and shall incorporate a positive compression fit of the gasket to both the manhole and the pipe.
2. Acceptable Manufacturers:
   a. NPC Inc.; Kor-N-Seal.
   b. Press-Seal Gasket Corp.; PSX Seal.
   c. A-LOK Products, Inc.

J. Modular, Mechanical Type Pipe Seal: Use modular, mechanical type pipe seal in making a core-drilled connection of piping to existing manholes or structures. Pipe seal construction as follows:
1. The seal shall consist of inter-locking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall opening.
2. The elastomeric element of the seal shall be sized and selected in accordance with the seal manufacturer's recommendations. Elastomeric element shall conform to ASTM D2000 requirements for EPDM material.
3. The hardware provided in the seal shall be as recommended by the seal manufacturer for buried service such as will exist at the project site.
4. Acceptable Manufacturers:
   a. Thunderline Corporation; Link-Seal.
   b. Or equal.

2.02 PRECAST REINFORCED CONCRETE MANHOLE COMPONENTS

A. Materials and Fabrication: Conforming to requirements specified in ASTM C478 except as follows:
1. Concrete: Composition and compressive strength conforming to ASTM C478 except use Type II or Type III cement in manhole components and increase compressive strength to 4,000 psi (at 28 days) in precast bases.
2. Casting and Curing: Wet cast and steam curing process in accordance with Section 3.6.11 and 3.7.2 of AWWA C302.
3. Manhole Steps: Factory installed in manhole components, prealigned vertically, spaced on equal centers, and located the minimum distance from ends of risers and top sections as indicated on Drawings.
4. Manhole Component Seals: As specified. Manhole component joints factory formed for self-centering concrete to concrete bearing employing either a rubber compression gasket or preformed plastic sealing compound.
5. Manhole Component Design: Designs shall conform to ASTM C478. Base, tapered and straight riser section, and top section dimensions and diameters, not consistent with ASTM C478, are as indicated on Drawings.
6. Lifting Holes and Lugs: Through-wall lifting holes not permitted in manhole component construction. Factory-install lifting keys or lugs integrally in manhole components.

B. Precast Base and Riser Sections: Design, materials and construction as specified previously under Materials and Fabrication.
1. Pipe Openings: Provide precast base sections with custom preformed pipe openings with integral pipe seals. Preform the pipe opening to accommodate the type of pipe and pipe opening seal required.
2. Prefabricated Pipe Opening Seals: Provide precast base sections with resilient gaskets of the types and designs which conform to the requirements specified in ASTM C923.
3. Doghouse Style/Poured-In-Place Base: Precast base section designed to fit over an existing active pipe line, allowing for the construction of the bottom portion (slab) to be

poured-in-place under the existing pipe. Construct the poured-in-place portion in accordance with the requirements specified hereinafter for Cast-In-Place Concrete Manhole Base.

C. Precast Tee Bases: Selection of pipe type construction shall determine the materials used for Tee Bases in accordance with the following:
   1. Noncylinder RCP Tee Bases.
   2. Lined-Cylinder RCP Tee Bases.
   3. Embedded-Cylinder RCP Tee Bases.
   4. RCP Tee Base Coating.

D. Precast Top Sections: Designs as required by the Drawings, and of materials and construction as specified herein, except additional and differing requirements as follows:
   1. Hold Down Bolt Inserts: Factory cast the inserts in the top section with no fewer than two 3/4-inch threaded inserts or slotted inserts to accommodate manhole frame hold down bolts. Provide threaded inserts of three inches depth and designed for an ultimate load in tension of 12,500 pounds. Inserts factory plugged for shipping. Coordinate insert locations in the top sections to match the bolt hole locations in the manhole cover frames.
   2. Flat Slab Tops: Shall be designed for HS-20 loading. Tops factory formed to properly accept and support required manhole cover frame and properly formed underside to join the top section to the riser section in a matching joint.
   3. Eccentric Cone Tops: Shall be designed for HS-20 loading. Provide precast tops of the same minimum wall thickness and with same area of circumferential steel reinforcement as riser sections.

E. Precast Grade Rings: Provide one-piece design (two-piece design not acceptable) precast concrete leveling and adjusting units of three inches or four inches thickness, and of materials and construction as specified previously under Materials and Fabrication.
   1. Provide precast grade rings with hold down bolt holes matching location of bolt holes in the cast iron manhole cover frame.
   2. The grade ring design shall provide for full bearing of the cast iron manhole cover frame.

F. Rubber Grade Rings: The Contractor shall have the option to provide rubber grade rings instead of the precast concrete grade rings in locations approved by the Engineer, or shall be required to provide the rubber grade rings exclusively as the Owner may require.
   1. Materials and Construction: Manufactured as compressed molded rubber meeting specific ASTM material and testing requirements. The molded design shall limit lateral movement after installation by an integral interlocking system of matching ribs and grooves. The finished units shall have the following minimum physical properties:

Physical Properties	Test Requirements	Test Number
Hardness, Shore A	82 plus/minus 5	ASTM D2240
Specific Gravity	1.1 to 1.2	ASTM D3676
Tensile PSI	754 PSI Min. with Grain 363 PSI Min. cross Grain	ASTM D412, Die C
Elongation, Percent	15 percent with grain 40 Percent Cross Grain	ASTM D412, Die C
Tear, kN/m (pi)	150 Min. with Grain 300 Min. cross Grain	ASTM D624, Die B
Heat Resistance 70H at 70C Hardness, Shore A Tensile PSI Elongation, Percent	 Plus/minus 10 percent Plus/minus 25 percent Plus/minus 25 percent	ASTM D573
Low Temperature Brittleness Not brittle at minus 40° C	Pass	ASTM D2137
Ozone Resistance kN/m (pi) Minimum Cross Grain Tear strength after exposure to 50 pphm for 50 hours at 38° C	150	ASTM D518

2. Acceptable Manufacturer: Grade-Rite as Distributed by Watertite, Inc., Box 2183, Grantville, PA 17028; or similar product by Aqua Dynamic Systems, Inc., Box 2290, Wilkes-Barre, PA 18703. ”

G. Dampproofing Coating: Provide asphalt compound coating of either the solvent type or the emulsion type. However, mixtures of the two types in the Project is not permitted.
   1. Solvent Type: Brush or spray-on asphalt compound, cold-applied.
   2. Emulsion-Type: Brush or spray-on asphalt-base, clay emulsion with fibers, cold-applied.
   3. Acceptable Manufacturers:
      a. W. R. Meadows, Inc.; SEALMASTIC.
      b. Coopers Creek; Coopers Black.
      c. Tnemec; 46-465.
      d. Or Approved Equal.
   4. Application: The coating may be either shop or field applied. Apply coating to the exterior of manhole components.
      a. Apply coating in two coats at the rate of 75 to 100 square feet per gallon per coat. Allow 24 hours drying between coats.

2.03 SOURCE QUALITY CONTROL

A. Tests, Inspection: As a condition of the Contract, certain materials require periodic testing according to methods referenced, or as required by the Engineer.
   1. Shop Tests:
      a. Manhole component manufacturers must be equipped to, and will perform the number of tests Engineer deems necessary to establish quality of proposed manhole components.

b. Have manufacturers furnish to the Engineer certified test records or reports with sworn statement of tests made as specified.

2. Precast Reinforced Concrete Manholes: Conduct tests as specified in ASTM C478.
3. Manhole Frames and Covers: Test for AASHTO H-20 highway loading. Test one manhole cover of each design submitted for approval.
4. Engineer reserves the right to accept certified test records or reports of previously conducted tests.

PART 3 EXECUTION

3.01 EXAMINATION

A. Field Inspection: Inspect precast reinforced concrete manhole components in accordance with requirements of ASTM C478 regarding repairable defects and defects subject to rejection by the Engineer.

3.02 PREPARATION

A. Earthwork: Perform earthwork for manhole installation as specified in Section 02316 and according to the following:
   1. Protection: During the earthwork operations, keep pipe and manhole interiors cleared of debris as construction progresses.

B. Waterproof Coating Touch-Up: Touch-up chipped, cracked, or abraded surfaces and finished joints with two coats of the factory applied waterproof coating material.
   1. Bring coating materials for touch up and field coating to the job site in the original sealed and labeled containers of the manufacturer.

C. Protective Coating Touch-Up: Touch-up chipped, cracked, or abraded surfaces and finished joints with two coats of the factory applied protective coating material.
   1. Bring coating materials for touch up and field coating to the job site in the original sealed and labeled containers of the manufacturer. The Contractor shall submit to the Engineer, immediately upon completion of the field applied coating, certification from the manufacturer indicating that the quantity of each coating purchased was sufficient to properly coat all surfaces.

3.03 MANHOLE CONSTRUCTION METHODS

A. Construction Options: The Contractor has the option to construct either cast-in-place concrete manhole bases or to provide precast concrete manhole bases, except where indicated otherwise on the Drawings.

B. Cast-In-Place Concrete Manhole Base Construction: Construct in accordance with design and dimensions indicated on Drawings. When necessary to construct wider or deeper manhole bases than indicated or specified, build such bases as required by the Engineer.
   1. Form and pour concrete in accordance with requirements of Section 03300. Additional requirements as follows:
      a. Vibrate poured concrete using mechanical vibrator of a type and design approved by Engineer. Use vibrators of type capable of transmitting vibration to concrete in frequencies of not less than five thousand impulses per minute.

b. Form and pour joint monolithically in manhole base top to match joint of adjoining precast riser section. Use template as obtained from precast concrete manhole component manufacturer of manhole components used in the Project.

2. Install piping in cast-in-place manhole bases prior to pouring the concrete.
   a. Apply Epoxy Bonding Compound in accordance with manufacturer's instructions to pipe at base connection prior to pouring the concrete.
   b. Install PVC Waterstop on pipes entering and leaving manhole base prior to pouring concrete. Install PVC Waterstop in accordance with manufacturer's written instructions.
3. Use Class A (4,000 psi) concrete as specified in Section 03300, unless indicated otherwise on Drawings.
4. Coat bases in accordance with the requirements for precast manhole components.

C. Precast Concrete Manhole Base Installation: Install precast base on a 6-inch deep compacted layer of aggregate meeting requirements in Section 02317.
   1. Set pipe in the Prefabricated Pipe Opening Seals so that an equal annular space is created on the interior and exterior of the wall of the manhole base section.
   2. Following pipe installation through the seal, grout the annular space at the pipe connection, on both sides of the wall, to the spring line of the pipe. Finish the grout smooth and flush with face of manhole.

D. Manhole Wall Installation: Provide precast reinforced concrete straight riser, tapered riser and top sections necessary to construct complete manholes. Fit the different manhole components together to permit watertight jointing and true vertical alignment of manhole steps.
   1. For rubber compression gaskets are used between sections, install gaskets and join sections in accordance with written instructions of manhole component manufacturer.

E. Lifting Recess Sealing: Seal with properly designed tapered rubber plugs. Drive plugs into recesses in such manner to render them completely water and air tight. Sealing of lifting recesses with grout not permitted.

F. Manhole Frame and Cover Installation: Where required, make final adjustment of frame to elevation using Grade Rings. Set manhole frame and cover to conform to roadway or surrounding grade, or as indicated on the drawings, and crown. Set top of manhole frame and cover 1/8-inch below finished paving elevation.
   1. Precast Concrete Grade Ring: Wet, but do not saturate the grade rings immediately before laying. Pre-set grade rings to proper plane and elevation using wedges or blocks of cementitious material not exceeding the joint thickness. No more than four wedges or blocks per grade ring permitted. Incorporate wedges or blocks in fresh mortar in a manner to completely encase each. Mortar thickness not to exceed 3/4-inch maximum and 3/8-inch minimum. Crown fresh mortar to produce squeeze-out between grade rings. Tool exposed joints with appropriately shaped tool and compact mortar edge into joints. Clean off excess mortar prior to initial mortar set.
   2. Rubber Grade Rings Installation: Install rubber grade rings in accordance with the manufacturer's written instructions using continuous beads of polyurethane base sealant on the concrete manhole surface, between each grade ring, and between the last grade ring and the manhole cover frame casting. Perform the manhole cover frame casting bolt-down operation following the grade ring installation.
   3. Cast Iron Manhole Frame and Cover Anchorage: Anchor manhole frames in place on manhole top section, or on leveling units, after installing 1/2-inch thick preformed plastic

sealing compound on bearing surface of manhole frame. Remove excess sealing compound squeeze-out after manhole frame is bolted in place.

a. Anchor Bolt Length: Size bolts according to the following:
    1) Sufficient length to properly pass through leveling units, if any.
    2) Sufficient length to engage full depth of manhole top section inserts.
    3) Sufficient length to allow enough threaded end to pass through manhole frame to properly tighten nut and washer.
b. Tighten manhole frame bolts after mortar has cured.
c. Install manhole covers using the proper bolts as provided with the covers for the waterproof installations.

G. Plugging Pipe Openings: Plug pipe openings in manholes where such openings are required for future pipe connections.
    1. Use masonry units and waterproofed mortar laid up to prevent deterioration.
    2. Install such materials to meet exfiltration limits and to allow future removal without damage to manhole.

H. Installation of Manhole Exterior (Infiltration Prevention) Seals: In general, install Manhole Section to Section Seals and Manhole Chimney Seals in accordance with the manufacturer's installation instructions and the following:
    1. Field Verification: Field verify the external measurements of the manhole sections and the manhole frame and chimney areas prior to ordering the applicable seals.
    2. Preparation: Clean the manhole frame (casting) and the concrete surfaces to the extent as required by the seal manufacturer. Additionally prepare the surfaces to be free from protruding defects.
    3. Specialty Installation Tools: Provide as required the specialty tools from the seals manufacturers for the installation of the two types of manhole seals."

3.04 FIELD QUALITY CONTROL

A. General: Make a visual inspection of each manhole constructed to ensure compliance with installation requirements.

B. Repair and Retest: Determine source or sources of leaks in manholes.
    1. Repair or replace defective materials and workmanship, as is the case, and conduct such additional visual inspections and such subsequent repairs as required until manholes meet requirements.
    2. Materials and methods used to make manhole repairs shall meet with Engineer's approval prior to use.
    3. Make repairs and replacements at no increase in Contract Price.

END OF SECTION

SECTION 02210

SUBSURFACE EXPLORATION

PART 1 GENERAL

1.01 SITE CONDITIONS

A. Limitations of Subsurface Information Indicated on Drawings: Certain information regarding the reputed presence, size, character and location of existing underground structures, pipelines, electrical and signal facilities, and other utilities has been indicated on the Drawings.
   1. Accuracy of Location: There is no certainty of the accuracy of this information, and the location of underground structures indicated may be inaccurate, and other obstructions than those indicated may be encountered.
   2. The Contractor hereby distinctly agrees:
      a. That neither the Owner nor the Engineer is responsible for the correctness or sufficiency of the information given;
      b. That in no event is this information to be considered as a part of the Contract;
      c. That the Contractor shall have no claim for delay or extra compensation or damage against the Owner or the Engineer on account of incorrectness of information given, or on account of the insufficiency or absence of information regarding obstruction either revealed or not revealed by the Drawings; and
      d. That the Contractor shall have no claim for relief from any obligation or responsibility under the Contract, in case the location, size or character of any pipe, electrical or signal facility or other underground structure is not as indicated on the Drawings, or in case any pipe, electrical or signal facility, or other underground utility or structure is encountered that is not indicated on the Drawings.

1.02 UTILITY LOCATION

A. Existing Utilities Mark-Out: The Contractor shall retain an independent utility locator service company with a minimum of five (5) years' experience to field locate, mark, and stakeout existing underground utilities and structures and service connections located in the area of work prior to starting work. The company shall be equipped with the latest state-of-the-art equipment.
   1. If required determine the exact location of utilities by hand excavated test pits or through vacuum methods. Support and protect all utilities to remain in place.
   2. Field locate, mark, and stakeout underground utilities prior to excavation.
   3. Use different colored markers for each separate utility run. Follow APWA uniform color code (ANSI Z535.1). Immediately take digital photographs to document the mapped utilities and provide same to the Engineer.
   4. Locate all utilities within areas of excavation and be responsible for the costs associated with the repair of utilities hit/damaged during construction.

1.03 SUBMITTALS

A. Submit to Engineer in accordance with Section 01330 information required to establish compliance with this section.

1. Qualifications and experience of underground utility locator service including a description of the types of utility locator equipment to be utilized.
2. At project completion, provide one (1) set of paper and one (1) copy of electronic plans documenting all utilities located and identified. All documentation shall be referenced to existing data (horizontal and vertical) previously established.

1.04 COORDINATION AND SCHEDULING

A. General Location: Within areas of excavations all utilities shall be field located and their locations marked at least one (1) day prior to the performance of the required excavation.

B. The performance of hand excavated test pits or vacuum excavations to determine the utilities exact location shall be performed just prior to performing the work to minimize the time that excavated areas will be exposed to erosive conditions.

C. Coordinate work with the Engineer to minimize utility disruptions and facility operations. The Engineer shall be notified at least three working days prior to performing the work and should be identified in the Contractors two week look ahead schedule.

D. Work in public areas shall be coordinated with the owning jurisdiction prior to start of work and shall follow all applicable requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 EXAMINATION

A. Tests holes shall be included in the lump sum bid price for the project and shall be performed by air vacuum excavation key-hole technology or other non-destructive techniques on existing utilities. One Call notification and obtaining permits shall be made prior to test hole excavation as necessary.

B. Stake test holes 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 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. Restore pavement in accordance with temporary pavement requirement on the Contract Drawings.

E. Locate test hole permanent markers using conventional or GPS survey equipment. Directly locate test hole markers to provide horizontal and vertical coordinates for each location relative to the project coordinate system.

F. Do not backfill test holes until directed by the Engineer. Take photographs of exposed piping and keep 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. All photographs shall be taken using a digital camera. Provide digital file to the Engineer. All prints shall be 4 inches by 6 inches. Trenching for new buried pipelines shall not be started until the locations of existing pipes and utilities are verified.

3.02 FIELD QUALITY CONTROL

A. The Engineer may limit or restrict scheduling of the utility locator service based upon project progress.

B. Notify the Engineer in writing when conflicts are found between the work and existing utility.

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SECTION 02225

REMOVAL AND ABANDONMENT OF EXISTING FACILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Abandonment of the existing Central Homes force main.

B. Related Sections:
   1. Excavation Support and Protection: Section 02260.
   2. Excavation: Section 02316
   3. Backfilling: Section 02317.
   4. Cast-In-Place Concrete: Section 03300.

1.02 REFERENCES

A. American Society for Testing and Materials:
   1. ASTM C32, Specification for Sewer and Manhole Brick (Made from Clay or Shale).
   2. ASTM C33, Specification for Concrete Aggregates.
   3. ASTM C144, Specification for Aggregate for Masonry Mortar.
   4. ASTM C150, Specification for Portland Cement.
   5. ASTM C207, Specification for Hydrated Lime for Masonry Purposes.
   6. ASTM C270, Specification for Mortar for Unit Masonry.

B. New York State Department of Transportation
   1. 733-01, Flowable Fill

1.03 SITE CONDITIONS

A. Dust Control: To prevent unnecessary spread of dust during performance of the work of this Section, thoroughly moisten surfaces and debris as required to prevent dust being a nuisance to the public, neighbors and concurrent performance of other work on the site. Water for use in dust control shall be obtained from Contractor's own source.

B. Protection: Exercise care during abandonment and removal work to confine operations of work to the facilities indicated on the Drawings. The physical means and methods used for protection are at the Contractor's option. However, should accidental damage occur, the Contractor will be completely responsible for replacement and restitution work of whatever nature with no additional compensation paid.
   1. Additionally, if public safety is endangered during the progress of the work of this Section, provide adequate protective measures to protect public pedestrian and vehicular traffic on streets and walkways.
   2. Signs, signals and barricades used shall conform to requirements of Federal, State and local laws, rules, regulations, precautions, orders and decrees.

C. Explosives and Blasting: Not allowed in performance of abandonment and removal work.

PART 2 PRODUCTS

2.01 MATERIALS

A. Temporary Materials: Materials needed or required for temporary protection in the form of barricades, fences, enclosures, etc., may be used construction materials of sound condition and reasonably clean. However, the condition of these materials shall meet or exceed the requirements of governing agencies or approving bodies as may be involved with the work.

B. Equipment: Equipment, machinery and apparatus (motorized or otherwise) used to perform the demolition and removal work may be used as chosen at the Contractor's discretion, but which will perform the work within the limits of the Contract requirements.

C. Select Earth Backfill: On site excavated material free of plant life, lumber, metal, refuse and rocks or similar hard objects larger than one inch in any dimension.

D. Aggregate Backfill: Refer to Section 02317.

E. Sand: Natural or manufactured sand conforming to ASTM C33.

F. Concrete: Class B (3000 psi) as specified in Section 03300.

G. Lean Concrete: 2000 psi compressive strength at 28 days with minimum cement content per cubic yard in accordance with current ready-mix plant standard practice.
   1. Reduced Aggregate: Aggregate with particle size not less than 1/8-inch or more than 1/2-inch in any dimension and a maximum of five percent of the particles passing a No. 8 sieve.

H. Flowable Backfill: Conforming to NYSDOT Section 733-01 for sealing existing manhole clean-outs.

PART 3 Pipe Plug Materials: Where existing piping is being abandoned in place construct pipe plugs in the open ends of such pipe in accordance with the standard details. EXECUTION

3.01 EXAMINATION

A. Field Inspection: Prior to performance of the actual work, carefully inspect the entire site and locate those facilities designated to be abandoned or removed, as indicated on the Drawings.
   1. Do not begin work of this Section without approval to do so by the Engineer.

B. Existing Utility Locations: Locate existing exposed and buried active utilities and determine the requirements for their protection.

3.02 PERFORMANCE

A. General Requirements: The means and methods of performing the work of the abandonment and removal operations are the sole responsibility of the Contractor.
   1. Debris Removal: Dispose of demolition debris off site in a lawful manner at an approved landfill site.

B. Excavation and Backfilling: Perform work in accordance with the requirements of Section 02316 and Section 02317.
   1. Should the Contractor in demolishing or removing existing facilities, such as existing pipelines, excavate below the subgrade for new facilities, he will be required to backfill the area excavated below the subgrade with Aggregate Backfill, at no increase in Contract Price.
   2. Backfill substructure cavities using Selected Compacted Fill. Restore surfaces in the area of demolished structures to match the surrounding area.

C. Salvage: The Owner has the right to claim as salvage any of the materials and equipment removed under the work of this Section. When the Contractor has carefully removed such items, should the Owner elect of salvage such items, the Contractor shall transport the salvaged items and store them at the Owner's wastewater treatment plant in the location as directed by the Owner.
   1. Existing removed materials and equipment, not claimed as salvage by the Owner, shall become the property of the Contractor and be disposed of in a lawful manner off site.

D. Plugging Existing Pipelines: Provide watertight seals by constructing pipe plugs in the open ends of pipelines being abandoned in place. Use Manhole Brick and Waterproofed Mortar to construct the pipe plugs.

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SECTION 02260

EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall design, furnish, obtain necessary permits, transport, place, maintain, and monitor excavation support systems, where necessary to perform the work of the Contract. The method of sheeting shall be at the sole discretion of the Contractor.

B. Related sections
   1. Submittal Procedures: Section 01330

1.02 REFERENCES

A. American Welding Society (AWS):
   1. D1.1 Structural Welding Code.

B. Western Wood Products Association:
   1. WWPA Catalog A - Product Use Manual

C. Southern Pine Inspection Bureau
   1. SPIB Standard Grading Rules for Southern Pine

D. American Society for Testing and Materials (ASTM):
   1. A 36/A 36M Standard Specification for Carbon Structural Steel
   2. ASTM A 328/A 328M Standard Specification for Steel Sheet Piling

E. Occupational Safety and Health Act (OSHA)

1.03 QUALITY CONTROL

A. Welders shall be certified in accordance with AWS D 1 - 1.

B. Design and calculations for sheeting and bracing shall be performed and sealed by a licensed Professional Engineer registered in the State of New York.

C. Address all imposed loads including temporary loads induced by construction equipment and traffic.

D. 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 does require him/her to inspect the work as the work progresses on a part time basis sufficient to adequately certify the system. He/she shall certify, in writing, that sheeting was installed in accordance with the supporting calculations and that the installer complied with recognized procedures, methods, and techniques.

E. The Engineer shall withhold partial payment for that portion of the sheeting work until the certification has been provided for record purposes only. An amount equal to 15% of the scheduled value will be withheld.

1.04 DESIGN CRITERIA

A. Design, furnish, install, monitor, maintain, and remove where applicable, temporary excavation support systems as specified herein, or as necessary to perform the work of the Contract. System shall be capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure, and superimposed track and construction live load surcharges.

B. Provide professional engineering services needed to assume engineering responsibility, including preparation of Shop Drawings and a comprehensive engineering analysis by a registered Professional Engineer licensed to practice in the State of New York.

C. Install excavation support and protection systems without damaging existing structures, buildings, railroad tracks, pavements, and other improvements adjacent to excavation.

D. All excavations shall conform to the applicable requirements of OSHA, including 29 CFR 1926, Subpart P.

1.05 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01330 all submittals required to establish compliance with this section including the following:

B. Shop Drawings for Acceptance: Prepared and sealed by a qualified Professional Engineer licensed to practice in the State of New York, for excavation support systems.
   1. Include Shop Drawings and calculations signed and sealed by the qualified Professional Engineer responsible for their preparation. Include the following:
      a. Size, cross-section, section modulus, and physical properties of the sheeting or soldier piles that will provide the maximum longitudinal bending moment for proper functioning of the temporary system.
      b. Minimum tip elevations of sheeting or soldier beams, in addition to bracing design to protect workers, adjoining properties, and the public.
      c. Mill test reports for temporary steel sheet piling or solider piles to be used on the project.
      d. The maximum forces that the excavation support system is subjected to during construction operations.
   2. Submit qualification data for Installer.
   3. Schedule and Sequence: Provide a detailed schedule of proposed construction operations, detailing each step of the proposed temporary construction operations.
   4. Contractor is fully responsible for performance of excavation support and protection system and assumes all responsibility for damage to adjacent structures and utilities. Modifications required during operation must be certified by the Professional Engineer responsible for original design as submitted.

1.06 PROJECT SITE CONDITIONS

A. Responsibility for Condition of Excavation: The Contractor is solely responsible for the condition of his excavations.

1. The failure or refusal of the Engineer to suggest the use of excavation support systems, or a better quality, grade, or section, or larger sizes of excavation support systems, or to suggest that excavation support systems be left in place; shall in no way or extent relieve the Contractor of his responsibility concerning the condition of excavation or of his obligations under the Contract, nor impose liability on the Engineer or the Owner.
2. No delay, whether caused by an action or want of action on the part of the Contractor, or by an act of the Engineer, Owner, or their agents, or employees, resulting in the keeping of an excavation open longer than would otherwise have been necessary, shall relieve the Contractor from the necessity of properly and adequately protecting the excavation from caving or slipping, nor from his obligations under the Contract relating to injury to persons or property, nor entitle him to claims for extra compensation.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Materials for excavation support systems may be new or used, provided they are sound and free from strength-impairing defects.

B. Structural steel for use as soldier piles, wales, braces and connections: Conform to ASTM A 36/A 36M.

C. Timber Lagging: Douglas Fir, Dense No. 2 or Southern Pine, No. 2 Dense, conforming to the rules and regulations of the Western Wood Products Association and the Southern Pine Inspection Bureau, respectively.

D. Steel Sheet Piling: Conform to ASTM A 328/A 328M; with continuous interlocks.

E. Sheeting Boxes: Steel, of size and dimensions capable of supporting excavation sides and soil pressures; structurally sound.

PART 3 EXECUTION

3.01 PREPARATION

A. Protect structures, railroad tracks, and utilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support system installation.
   1. Shore, support, and protect utilities encountered.

B. Install excavation support system to ensure minimum interference with other structures.

C. Locate excavation support system clear of permanent construction so that installation of foundation elements, forming, and concrete placement for cap, pedestal, or other structures is not impeded.

D. Monitor excavation support system daily during excavation progress and for as long as excavation remains open. Promptly correct bulges, breakage, or other evidence of movement to ensure that excavation support system remains stable.

E. Promptly repair damages to existing facilities caused by installing excavation support system; or as a result of movement while excavation is open.

3.02 SOLDIER PILES AND LAGGING

A. Install soldier piles before starting excavation. Space soldier piles at regular intervals not to exceed the allowable flexural strength of soldier piles or lagging. Accurately align exposed faces of flanges to vary not more than 50 mm (2 in.) from horizontal and not more than 1:120 out of vertical alignment. Due to minimal vertical clearance, soldier piles may need to be placed in predrilled holes and then concreted or backfilled with flowable fill.

B. Install wood lagging within flanges of soldier piles as excavation proceeds from the top down. Trim excavation as required to install lagging. Fill voids behind lagging with soil as the excavation progresses and compact.

C. Install horizontal wales if required in the excavation support system design.

3.03 STEEL SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Sheet pile installation may be hindered by the presence of boulders and rubble fill in the existing fill material. Accurately align exposed faces of sheet piling to vary by not more than 2 in. from horizontal and not more than 1:120 out of vertical alignment.

B. Sheet piles shall be driven in pairs with adjacent pairs not leading each other by more than 4 ft.

C. Sheet piles shall be driven with the ball-end leading to minimize soil entering the interlocks.

D. Sheet piles shall be driven plumb to the depths required by the Shop Drawings, with each pile interlocked with adjoining sheet piles for the entire length of the pile.

E. Sheet piles driven out of interlock with adjacent sheet piles shall be removed and replaced with new sheet piles by the Contractor.

F. Jetting will not be permitted.

G. Splices will not be permitted.

H. Obstructions:
   1. In the event that a sheet pile strikes an obstruction, adjacent sheets shall be driven below the elevation of the obstruction before attempting to drive through or clear the obstruction.
   2. The Contractor shall have on hand suitable equipment for spudding through buried timber and similar obstructions.

I. Defective or Damaged Sheet Piles:
   1. Sheet piles shall be driven by approved methods in such a manner as to not damage the sheets and to insure proper interlocking throughout their length. In the event that any sheeting interlock becomes disengaged, the Contractor shall do whatever is necessary to complete the work as shown and specified without additional compensation.

2. If sheet piling is damaged during installation, driven out of the specified tolerances, or rejected by the Engineer, it shall be removed and replaced at the Contractor's expense.
3. Rejected or damaged sheet piles shall be pulled.

3.04 SHEETING BOX

A. Place box in trench utilizing a means that 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 UNDERPINNING

A. Provide underpinning of adjacent structures as required to avoid undermining structures during excavation.

B. The length of an individual underpinning pit shall not be more than 5 feet depending upon the type of existing footing. The design shall show that the underpinning provides adequate bearing for existing building loads. No two adjacent pits shall be excavated simultaneously and at least 8 feet of undisturbed bearing shall remain between pits being excavated concurrently.

C. The pits shall be filled with concrete leaving a 2-inch space between the top of the underpinning and the bottom of the existing foundation. The next day the space shall be completely filled with nonshrink grout. Load transfer shall occur after mortar or grout has set.

D. The design shall consider the earth loads acting on the underpinning and provide tiebacks or braces as required to resist these loads and minimize deflection.

3.06 REMOVAL AND REPAIRS

A. Remove excavation support and protection system when construction has progressed sufficiently to support excavation and bear soil, track surcharge, and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging utilities.

B. Repair or replace adjacent work damaged or displaced by removing excavation support and protection system.

C. All excavation support and protection systems shall be removed from the site once its use is no longer required.

3.07 RESTORATION

A. Restore existing structures to conditions equivalent to those existing prior to the start of work, including repair of settlement-related damage, at no additional cost to the Owner.

END OF SECTION

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SECTION 02316

EXCAVATION

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: This specification describes excavation and disposal of all material as specified herein, shown on the Contract Drawings or required, for the purpose of building structures, conduits, pipelines and other structures as well as grading and completing the work in every respect.

B. Excavation work includes stripping and stockpiling of topsoil, sheeting and bracing, excavation over the site, excavation for roads, pipelines and structures, control of water, segregation and stockpiling of excavated material, disposal of unsuitable material and excess excavated material, and trimming, shaping and grading of excavations, all complete and in place as shown on the Contract Drawings, specified and directed. The work includes the excavation of any material which, in the opinion of the Engineer, is necessary to be excavated for any purpose pertinent to the construction of the work.

C. Related Sections
1. Submittal Procedures: Section 01330
2. Excavation Support and Protection: Section 02260
3. Backfilling: Section 02317
4. Dust, Soil Erosion and Sedimentation Control: Section 02371
5. Seeding: Section 02921

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)
1. D1557-Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3)

B. Occupational Safety and Health Administration (OSHA)

C. Board of Appeals, N.Y.S. Department of Labor

D. New York State Department of Transportation (NYSDOT)

E. New York State Department of Environmental Conservation (NYSDEC)

F. U.S. Environmental Protection Agency

1.03 DEFINITIONS

A. Suitable Material - any material whose composition is satisfactory for use as fill. Any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or manmade (i.e. recycled) origin, including mixtures thereof that do not exhibit signs of contamination are considered suitable materials.

B. Unsuitable Materials – any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, that is not satisfactory for the use as fill material. Any materials exhibiting signs of being contaminated or manmade deposits of industrial waste are also unsuitable materials.

C. Excavated Material: All material regardless of its nature, except rock or boulders that has been excavated.

D. Topsoil: Topsoil shall consist of natural loam, free from subsoil, obtained from an area which has never been stripped. Topsoil is friable clay loam surface soil found in a depth of not less than 4 inches, and is substantially free of subsoil, clay lumps, stones, and other objects over 2 inches in diameter, and without weeds, roots, and other objectionable material. Topsoil meeting this definition, having a minimum organic content of 5% and meeting the requirements of Section 02921 – Seeding shall be considered suitable for use on-site.

E. Backfill: Material to be excavated and proposed for reuse on the site as backfill must meet the definition of Suitable Material.

1.04 SUBMITTALS

A. Submit for approval in accordance with Section 01330, shop drawings, product data, and samples required to establish compliance with this section.

B. Before commencing any excavating operations, submit working drawings of all sheeting and bracing, cofferdams, bridging, decking, soldier beams and lagging, and other temporary supporting structures in accordance with Section 02260 Excavation Support and Protection.

1.05 REGULATORY REQUIREMENTS

A. Excavation operations and related work shall be performed in strict compliance with, the applicable sections of OSHA 1926 Subpart P-Excavations and N.Y.S. Department of Labor, Industrial Board of Appeals, Part 23 Protection in Construction, Demolition and Excavation Operations latest editions.

1.06 SITE CONDITIONS

A. Actual Conditions: Perform any geotechnical investigations deemed necessary to determine actual site conditions.

B. Underground Utilities: Locate and identify all existing underground utilities prior to the commencement of work.

1.07 SPECIAL REQUIREMENTS

A. Dust, Soil Erosion and Sedimentation Control: The Contractor's operations shall conform to the requirements of Section 02371 – Dust, Soil Erosion and Sedimentation Control.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Stripping: Completely strip all topsoil and earth containing roots away from areas which have been cleared and grubbed. Topsoil which is determined by the Engineer to be suitable for future reuse by the Owner shall be stripped separately and stockpiled at locations on the site as directed by the Engineer. Topsoil to be re-used on-site shall comply with the requirements of Section 02921 – Seeding.

B. Sheeting and Bracing: The Contractor shall provide all labor, equipment, materials and incidental items and services necessary to install and maintain sheeting and bracing as it requires for the project. Sheeting and bracing shall include but not limited to:
   1. Furnish, install, preload and maintain a system of wales, struts, kickers and bracing appurtenances to shore portions of the earth support walls.
   2. After support is provided, including installation of base slabs, unload and remove wales, struts, kickers and bracing as required.
   3. The arrangement, construction, testing and maintenance of the lateral bracing system shall be the responsibility of the Contractor.

C. Structure Excavation
   1. Excavations shall be of sufficient size to permit the work to be economically and properly constructed in the manner and of the size specified, except where limits of excavation are provided on the Contract Drawings. The bottom of the excavation in earth and rock shall have the shape and dimensions of the underside of the structure with allowance for the concrete work mat or compacted aggregate base layer.
   2. Exercise care to prevent disturbing or loosening of the soil in the excavation. Densify the bearing surface for all structures with an approved type vibratory compactor to 95 percent of the maximum dry density obtainable by ASTM D1557 before the construction of any foundations. Where the depth of disturbed or loosened soils is greater than 12 inches or; as determined by the Engineer, that it will require special compaction; the Contractor shall propose the appropriate method of compaction and submit to the Engineer for approval. All disturbed or loosened soils as determined by the Engineer that should be removed shall be replaced in accordance with the requirements of Paragraph 3.01, H “Unauthorized Excavation".

D. Site Excavation: Excavate over the site within the limits of site grading to conform to finished site grades. Arrange the excavation work to permit continuous surface drainage off the site, eliminate low spots and surface ponding, and prevent runoff from flowing into the surrounding areas.

E. Trench Excavation:
   1. Maintain the minimum trench width adequate to place, joint and backfill the pipe or conduit properly. The clear width of the trench at the level of the top of the pipe shall not exceed the sum of the outside diameter of the pipe barrel plus 20 inches for pipe 4 through 24 inches in diameter nor the outside diameter of the pipe barrel plus 2 feet for pipe more than 24 inches in diameter, unless otherwise approved by the Engineer. The banks of pipe trenches shall be as near to vertical as practicable.

2. Length of Excavation: Make excavation for the sewers, drains, ducts, conduits or pipe lines only a reasonable distance in advance of pipe laying, at the discretion of the Engineer, and as may be indicated by the supply of materials on hand.
3. In sheeted trenches, measure the clear width of the trench at the level of the top of the pipe to the inside of the sheeting.
    a. Pipes placed in trenches wider than specified above shall be provided with concrete cradle or encasement as directed by the Engineer. No separate payment will be made for such cradles or encasement.
    b. Do not over excavate the bottom of the trenches. The bottom of trenches shall be graded accurately to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along its entire length (except for the portions of the pipe sections where it is necessary to excavate for bell hole, for the proper sealing of pipe joints, and as hereinafter specified).
    c. Dig bell holes and depressions for joints after the trench bottom has been graded. In order that the pipe rests on the prepared bottom for as nearly its full length as practicable, make bell holes and depressions only of such length, depth, and width as required for properly making the particular type of joint. Remove stones as necessary to avoid point bearing. Except as hereinafter specified for wet or otherwise unstable material, backfill over depths with materials specified for backfilling the lower portion of trenches. Whenever wet or otherwise unstable material that is incapable of properly supporting the pipe is encountered in the bottom of the trench, over excavate such material (a minimum of 2 feet below pipe) to a depth to allow for construction of stable pipe bedding. Backfill the trench to the proper grade with suitable approved materials as per Section 02317 – Backfilling.
    d. If unstable material is exposed at the level of the bottom of the trench excavation, it shall be excavated in accordance with Paragraph 3.01, G "Authorized Additional Excavation". When the Engineer judges that the unstable material extends to an excessive depth, it may advise the Contractor, in writing, to stabilize the trench bottom with additional select fill or pipe bedding material or to ensure firm support for the pipe or electrical duct by other suitable methods. Payment for such trench stabilization will be made as described for "Authorized Additional Excavation."
    e. The open, excavated trench preceding the pipe laying operation and the unfilled trench with pipe in place shall be kept to a minimum length, causing the least possible disturbance. Means of egress shall be located so as to require no more than 25 feet of lateral travel by employees. Ladders shall extend a minimum of 36 inches above the top of the sheeting or be tied down with a grab rail provided.
    f. No water shall be allowed to rise in the trench excavation until sufficient backfill has been placed to prevent pipe flotation.

F. Authorized Additional Excavation: In case the materials encountered at the elevations shown on the Contract Drawings are not suitable, or in case it is found desirable or necessary to go to an additional depth or to an additional depth and width, carry the excavation to such additional depth and width as the Engineer may direct in writing. Refill such excavated space with either 2,500 psi concrete or compacted select fill materials, as ordered. Where necessary, compact fill materials to avoid future settlement. Use select fill materials meeting the requirements of Section 02317 – Backfilling and compact to attain a minimum degree of compaction of 95 percent of the maximum dry density as determined by ASTM D1557. Place backfill in lifts not exceeding 9 inches in loose thickness. The Contractor will be paid under the unit price bid item for additional authorized excavation.

G. Unauthorized Excavation: Wherever the excavation is carried beyond or below the lines and grades shown on the Contract Drawings or given by the Engineer, except as specified in Paragraph 3.01, G "Authorized Additional Excavation", refill all such excavated space with such material and in such a manner as may be directed by the Engineer in order to insure the stability of the various structures. Areas excavated beneath all manholes, structures, pipelines or conduits without authority shall be refilled by the Contractor at his own expense with 2,500 psi concrete or compacted select fill material and properly compacted as ordered by the Engineer.

H. Explosives: Do not use explosives for any excavation work.

3.02 LINES AND GRADES

A. General: Excavate for sewers, drains, conduits, pipe lines, walls, foundations, footings, and other structures, including any excavating indicated on the Contract Drawings or necessary, to the lines and grades shown on the Contract Drawings, specified or required.

B. Demolition: Cut pavements, curbs and sidewalks with non-impact tools or other equipment approved by the Engineer. Breaking of pavements, curbs and sidewalks by impact, such as with the use of a ball, is not permitted. When removing sections next to sections that are to remain, sawcut the full depth of the concrete and asphalt.

C. Adequate Space: Do all trimming, grading and other incidental work to the grades and slopes shown on the Contract Drawings, specified or required as approved by the Engineer. Perform all excavations of sufficient size for the proper execution and inspection of the work. Keep excavation in good condition at all times and fill all voids which may endanger existing structures to the satisfaction of the Engineer.

3.03 SUBGRADE CONSOLIDATION

A. Consolidating Suitable Materials: Materials used in the bottom of excavation to replace boggy and other yielding or unsound materials, for providing solid and firm foundations for the structures to be built thereon, where approved in writing, may be either select fill or lean concrete.

3.04 FROST PREVENTION

A. Protection shall be provided against the penetration of frost into material below the bearing level during work in the winter months. This protection shall consist of a temporary blanket of straw or salt hay covered with a plastic membrane or other approved means.

3.05 SEGREGATION, STORAGE AND DISPOSAL OF MATERIALS

A. Segregating: All unsuitable material which may be excavated by the Contractor in its operations shall be kept separated from suitable excavated material and disposed offsite. Soil that shows evidence of characteristics attributable to hazardous or contaminated material shall be sampled and analyzed.

B. Stockpiling: Excavated material to be used for backfilling onsite shall be so piled and placed as not to encumber sidewalks or roadways, or wash away or obstruct the free flow of surface or drainage water. Excavated material shall not be placed closer to the edge of an excavation than

a distance equal to 1-1/2 times the depth of the excavation, unless the excavation is in rock or the sides of the excavation have been sloped or sheeted and shored to withstand the lateral forces imposed by such superimposed loads.

1. All stockpiles of excavated soil shall be covered with an impermeable, woven polyethylene fabric. The fabric shall be a composite structure of woven polyethylene fabric and 1.5 mils of polyethylene film laminated on both sides to form a monolithic sheet. The fabric shall be inert to biological degradation and naturally encountered chemicals, alkalies and acids. Its permeability coefficient shall be less than 10-3 cm/sec. The terminal edges of the fabric panels shall be secured to prevent uplift by wind. Stockpiles shall be covered during non-working hours and during periods of no construction activity.
2. Place silt fencing around each stockpile leaving an appropriately sized opening for access on the upgradient side of the stockpile.

C. Excess Materials: The Contractor shall make arrangements for and properly transport and dispose or re-use the soil offsite. Contractor is solely responsible for the costs of any testing required by the receiving entity.

3.06 REMOVAL OF WATER

A. Conform to the requirements of 02371 – Dust, Soil Erosion and Sedimentation Control.

B. Care of Water: At all times during construction of the work and at its completion for final inspection, provide and maintain ample means and suitable equipment with which to promptly remove and properly dispose of all water entering excavations or other parts of the work. Keep all excavations dry at all times until the structures to be built therein are completed and backfilled to approximately final grades except where otherwise approved by the Engineer in writing. Do not permit sewage from existing sewers and house connections to flow into excavations.

C. To prevent flotation or uplift of the structure or portions of the structure under construction, provide approved dewatering or freezing methods which shall operate under supervision 24 hours per day, including holidays and weekends. Maintain this dewatering or other system in continuous operation until the structure or portions of the structure are substantially completed to a gravity load 10 percent greater than the upward load caused by the ground water uplift pressure measured and computed from the original ground water level. Place backfill and mechanically compact it to approximately final grade after the structure has achieved the required strength, except where otherwise approved by the Engineer in writing. In addition, provide and have available at the work site suitable standby equipment for prompt replacement during breakdowns of operating equipment.

D. The dewatering system shall be maintained in operation until the backfill is completed to a minimum of one foot above normal ground water level.

E. Obtain written approval from the Engineer before discontinuing the dewatering or other groundwater control system.

F. Where water or sewage has accumulated or is flowing in the completed or partly completed structures, remove and dispose of such water or sewage during the time covered by the Contract, unless otherwise directed by the Engineer.

G. The Contractor shall take care of all sewer drainage interfered with by his operations to the satisfaction of the Engineer. Drainage into trench excavations is expressly prohibited.

3.07 FENCING, BRIDGING AND DECKING

A. All excavations or openings made under this Contract in any public street, park or place, or in any adjoining property, shall be immediately enclosed by a guard fence constructed in a neat and workmanlike. Where a tight board fence is specified, no guard fence will be required, provided there is no delay in the erection of the tight board fence.

B. Wherever a driveway occurs, construct a bridge of adequate strength and width and provide with side railings to span the excavation.

C. Wherever the distance between available crossings over the excavation is, in the opinion of the Engineer, excessive, he may order a temporary foot bridge with side rails to be constructed.

D. At all street intersections, excavations made from the surface shall be decked over in a substantial manner so that traffic can be maintained at all times except as herein provided for. The removal of the pavement and the placing of the decking shall be done during the hours of a day or night which will cause the least inconvenience to adjoining property owners and to public traffic in general. During certain designated hours of the day or night, sections of planking not more than ten feet in length may be temporarily removed for the purpose of removing excavated material, receiving materials of construction or for backfilling.

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SECTION 02317

BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: Backfilling work includes furnishing, placing and compacting all fill material necessary to bring excavations and site work to final grade as shown, specified or required.

B. Backfilling – Use excavated material from on site that meets the definition of Suitable Material.

C. Related Sections
   1. Submittal Procedures: Section 01330
   2. Excavation: Section 02316
   3. Dust, Soil Erosion and Sedimentation Control: Section 02371
   4. Seeding: Section 02921
   5. Cast-In-Place Concrete: Section 03300

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM)
   1. C131 -Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
   2. C143 -Slump of Portland Cement Concrete
   3. C330 -Lightweight Aggregates for Structural Concrete
   4. D422 -Standard Test Method for Particle-Size Analysis of Soils
   5. D698 -Test Method for Laboratory Compaction in Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m3))
   6. D1556 -Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method
   7. D1557 -Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft)
   8. D2167 -Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
   9. D2922 -Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)
   10. D4318 -Standard Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils
   11. D4832 -Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Cylinders
   12. D6023 -Test Method for Unit Weight, Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low Strength Material (CLSM)

13. D6024 -Test Method for Ball Drop on Controlled Low Strength Material (CLSM) to Determine Suitability for Load Application

1.03 DEFINITIONS

A. Suitable Material – any material whose composition is satisfactory for use as fill. Any mineral (inorganic) soil, blasted or broken rock and similar materials of natural or manmade (i.e. recycled) origin, including mixtures thereof that do not exhibit signs of contamination are considered suitable materials.

B. Unsuitable Materials – any material containing vegetable or organic matter such as muck, peat, organic silt, topsoil or sod, that is not satisfactory for the use as fill material. Any materials exhibiting signs of being contaminated or manmade deposits of industrial waste are also unsuitable materials.

1.04 SUBMITTALS

A. Submit for approval in accordance with Section 01330, shop drawings, product data, and samples required to establish compliance with this section.

B. Name and location of all suppliers.

C. Certificate of compliance with standard specified for each source of material.

D. Prior to stockpiling or placing of select fill materials at the job site, submit for approval approximately 100-pound samples representative of the fill at the proposed borrow source. In addition, submit documentation of the availability of the required fill quantities at any proposed borrow source.

E. Submit optimum moisture - maximum density curves and reports for all fill material before placement of fill.

F. Results of all compaction tests for fill placement.

G. Proposed independent materials testing laboratory qualifications and certifications.

H. Mix design for flowable fill, including all materials used and trial mix test results.

I. Certification by the lightweight fill producer of the gradation, dry loose unit weight, dry compacted unit weight and Los Angeles Abrasion Test loss for the proposed lightweight fill source.

1.05 QUALITY CONTROL

A. Testing: The Contractor shall retain the services of an independent materials testing laboratory to perform the following laboratory and field tests.

B. All materials used in construction, whether brought to the site or developed from on-site sources, shall be tested for optimum moisture-maximum density curve, and reports of the test results for each source shall be submitted promptly. The tests shall be as follows:

Test	ASTM STANDARD	Tests Per Volume Delivered
Gradation	D422	1 per 200 C.Y.
Compaction or Density	D1557	1 per 200 C.Y.

C. Acceptability of completed compaction shall be demonstrated by tests performed by the Contractor and accepted by the Engineer. The minimum number of tests shall be determined by quantity of material placed, and reports of the test results shall be submitted promptly. The Contractor shall perform either of the following tests subject to the approval of the Engineer:

Test	ASTM STANDARD	Tests Per Volume Placed
In-Place Density	D2167 D2922	1 per 200 cy

D. The Contractor shall engage the services of a testing laboratory, with the qualifications required by Section 03300, and experienced in design and testing of flowable fill materials and mixes, to perform material evaluation tests and to design mixes for flowable fill. A trial mix shall be performed to verify the flowable fill mix design. The trial mix shall also report slump, air content, yield, cement content, and dry unit weight per ASTM C143 and ASTM D6023.

1.06 DELIVERY AND STORAGE

A. Materials delivered to the site shall be stored in a manner to prevent contamination and segregation.

PART 2 PRODUCTS

2.01 BACKFILL MATERIAL - GENERAL

A. General: Backfill with suitable materials, free from waste, organic matter, rubbish, boggy or other unsuitable materials.
   1. Offsite Imported Materials: Fill that is brought on site to be used as backfill must meet the requirements of NYSDEC Subpart 375-6 for intended site end use.

B. Materials Requirements: Follow common fill requirements whenever drainage or select fill is not specified. Determine and obtain the approval of the Engineer for the appropriate test method where more than one compaction test method is specified.

C. Wet and Frozen Materials: Do not use wet or frozen material for backfilling.

D. Size: The maximum stone size shall be two-thirds of the thickness of the backfill lift, but in no case shall material containing stones over 10 inches in the largest dimension be used for backfill.

2.02 MATERIALS

A. Type A: Use angular, washed natural stone; free of shale, clay, friable material, sand, debris, graded in accordance with ANSI/ASTM C136 within the following limits:

U.S. Standard Sieve	**Percent Passing By Weight**
2 inch	100
1 inch	95
3/4 inch	75 - 90
5/8 inch	35 - 60
3/8 inch	15 – 35
#4	<5

B. Type B - Pea gravel, natural stone, washed; free of clay, shale or organic matter; graded in accordance with ANSI/ASTM C-136 within the following limits:
   1. Minimum Size: ¼-inch (6.4 mm)
   2. Maximum Size: 5/8-inch (16 mm)

C. Type C – Sand (Structural Fill): Natural river or bank sand, washed; free of silt, clay, loan, friable or soluble materials, or organic matter; graded in accordance with ANSI/ASTM C136, within the following limits:

U.S. Standard Sieve	Percent Passing By Weight
#4	100
#14	10 – 100
#50	5 – 90
#100	4 - 30
#200	0 - 1

D. Type D – Subsoil: Reused excavated material, graded; free of lumps, rocks and gravel larger than 3 inches in size, debris and contaminants.

E. Type E – ¾ inch crushed blue stone surfacing: Angular, washed blue stone; free of shale, clay, friable material, sand and debris.

F. Cohesive Materials On-Site: Cohesive site material may be used as common fill as follows:
   1. The gradation requirements do not apply to cohesive common fill.
   2. Use material having a liquid limit less than or equal to 40 and a plasticity index less than or equal to 20, as determined by ASTM D4318.

G. Material Approval: All material used as common fill is subject to approval by the Engineer. If there is insufficient suitable material on site, import whatever additional material is required which conforms to the specifications, at no additional cost to the Owner.

2.03 PIPE BEDDING

A. Gradation for Small Piping: For pipe 18 inches or less in diameter, use pipe bedding material of which 90 percent will be retained on a No. 8 sieve and 100 percent of which will pass a 1/2 inch sieve and be well graded between those limits.

B. Gradation for Large Piping: For pipe larger than 18 inches in diameter, use the same pipe bedding material as specified for smaller pipe or use a similar well graded material of which 90 percent will be retained on a No. 8 sieve, 100 percent will pass a 1-inch sieve, and will be well graded between those limits.

2.04 LIGHTWEIGHT FILL

A. Lightweight fill shall be a lightweight aggregate produced by the rotary kiln method and meeting the requirements of ASTM C330. No byproduct slags or cinders are permitted.

B. The material shall meet the grading requirements of ASTM C330, Table 1, Coarse Aggregate: 3/4 inch to No. 4.

C. Dry loose unit weight shall be maximum of 55 pcf. Dry compacted unit weight shall be a maximum of 60 pcf when measured by a one-point test performed in accordance with ASTM D698.

D. Maximum Los Angeles Abrasion Test loss of 50 percent when tested in accordance with ASTM C131 (B grading).

2.05 UNDERGROUND WARNING TAPE

A. Metallic Utility Lines: For open cut excavation installation, printed 4-mil polyethylene non-detectable tape, six inches minimum width, color coded with black ink on APWA (American Public Works Association) approved colors, one inch minimum lettering, printed with name of utility buried below, and suitable for installation in all soil types.

B. Non-Metallic Utility Lines: Printed 5-mil polyethylene aluminum backed, detectable tape, six inches minimum width, color coded with black ink on APWA (American Public Works Association) approved colors, one inch minimum lettering, printed with name of utility buried below, and suitable for installation in all soil types.

C. Provide underground detectable warning tape for the following pipe lines and utilities as installed or encountered in the work:
   1. Caution Buried Sewer Line Below - Green.
   2. Caution Buried Electric Line Below - Red.
   3. For all un-named buried line types – discuss with the Owner and Engineer.

D. Acceptable Manufacturers:
   1. Seton Identification Products.
   2. Or Approved Equal.

PART 3 EXECUTION

3.01 GENERAL

A. Backfill all excavations to the original surface of the ground or to such other grades as may be shown or required. For areas to be covered by lawn mix, leave or stop backfill 12 inches below

the finished grade or as otherwise required to provide adequate depth of lawn mix to satisfy the requirements of Section 02921. Obtain approval for the time elapsing before backfilling against recently constructed masonry structures. Remove from all backfill, and from the space being backfilled, any compressible, putrescible, or destructible rubbish and refuse and all lumber and braces before backfilling is started. Leave sheeting and bracing in place or remove as the work progresses.

B. Equipment Limitations: Do not permit construction equipment used to backfill to travel against and over cast-in-place concrete structures until the specified concrete strength has been obtained, as verified by concrete test cylinders. In special cases where conditions warrant, the above restriction may be modified provided the concrete has gained sufficient strength, as determined from test cylinders, to satisfy design requirements for the removal of forms and the application of load.

C. Dust, Soil Erosion and Sedimentation Control: The Contractor's operations shall conform to the requirements of Section 02371.

D. Testing: No material shall be placed until satisfactory test reports for material type and compaction requirements have been approved by the Engineer.

E. Warning tape/ribbon shall be placed and/or restored as required when backfilling new and existing utility lines.

3.02 PIPE BEDDING AND INITIAL BACKFILL

A. Hand Placement: Place select fill by hand for initial pipe backfill from top of bedding to 1 foot over top of pipes in uniform layers not greater than 6 inches in loose thickness. Tamp under pipe haunches and thoroughly compact in place the select fill with suitable mechanical or pneumatic tools to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

B. Stone Placement: Do not place stone fragments larger than 2-inch size in the pipe bedding or in the backfill to 1 foot over the top of pipes, nor any stone fragments larger than 3-inch size nearer than 2 feet from any pipe, conduit or concrete wall.

C. Unallowed Materials: Pipe bedding containing very fine sand, uniformly graded sands and gravels, or other materials that have a tendency to flow under pressure when wet, is unacceptable.

3.03 TRENCH BACKFILL

A. General: Backfill trenches from 1 foot over the top of the pipe, from the top of electrical duct bedding or as shown to the bottom of pavement base course, subgrade for lawns or lawn replacement, to the top of the existing ground surface or to such other grades as may be shown or required. Backfill trenches as soon as, in the opinion of the Engineer, it can be done without injury to the concrete or pipe lines.

B. Materials: Provide select fill, suitable job-excavated material or other material, as specified and as approved for trench backfill.

C. Depth of Placement - General: Except under pavements, walkways, railroad tracks, and street or highway appurtenances, or as otherwise specified, place trench backfill in uniform layers not greater than 9 inches in loose thickness and thoroughly compact in place using suitable mechanical or pneumatic equipment. Compact backfill to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

D. Depth of Placement - Traffic Areas and Under Utilities: Where pavements, walkways, railroad tracks and street or highway appurtenances are to be placed over trenches and under utilities or utility services crossing the trench, provide trench backfill using select fill placed in uniform layers not greater than 9 inches in loose thickness and thoroughly compacted in place with equipment as specified above. Compact backfill to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

E. Depth of Placement - Undeveloped Areas: In undeveloped areas and where select fill material or hand-placed backfill are not specified or required, place suitable job-excavated material or other approved backfill in lifts not exceeding 12 inches in loose thickness. When the trench is full, consolidate the backfill by jetting, spading, tamping or puddling to ensure complete filling of the excavation. Mound the top of the trench approximately 12 inches to allow for consolidation of backfill.

F. Dropping of Material on Work: Backfill trenches in such a way as to prevent dropping material directly on top of any conduit or pipe through any great vertical distance. Do not allow backfilling material from a bucket to fall directly on a structure or pipe and, in all cases, lower the bucket so that the shock of falling earth will not cause damage.

G. Distribution of Large Materials: Break up lumps and distribute any stones, pieces of crushed rock or lumps which cannot readily be broken up, throughout the mass so that all interstices are solidly filled with fine material.

H. Temporary Bulkhead for Trenches: Retain backfill in trenches by temporary bulkheads only and remove them as the backfilling progresses. Do not make bulkheads of stone.

I. Sewers Not to be Covered: Do not cover sewers, drains, basin connections, ends of sewers and branches until the Engineer orders or gives permission to backfill.

J. Temporary Pavement: After completion of backfilling in streets, remove all surplus material, and regrade and leave free, clear, and in good order all roadways and sidewalks. Deposit and compact a temporary surface of asphalt, or other equivalent and suitable material to a depth of two inches on all backfilled areas. The temporary paving is considered part of the price of installing the pipe and is included in the bid price. Until areas are restored to their original condition, maintain the surface of the temporary pavement in good and safe condition and promptly fill all depressions caused by settlement of the backfill with the temporary surfacing materials and compact the same. Wet the temporary surface by spraying with water when necessary to prevent a dust nuisance.

3.04 DRAINAGE BLANKET

A. Provide a drainage blanket consisting of drainage fill where shown, specified, or required. Place drainage fill in uniform layers not greater than 8 inches in loose thickness.

B. Where drainage fill is required underneath structures or adjacent to structures where pipes, connections, electrical ducts and structural foundations will be located within the fill, compact the fill with suitable mechanical or pneumatic equipment to not less than 95 percent of the maximum dry density as determined by ASTM D1557.

C. Where drainage fill is required in areas not specified in Paragraph 3.08 B, compact with suitable mechanical or pneumatic equipment to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

3.05 EARTH EMBANKMENTS

A. Make all earth embankments of approved cohesive common fill material.

B. Place fill in uniform layers not greater than 10 inches in loose thickness. Compact in place with suitable approved mechanical equipment.

C. Compact earth embankments to not less than 90 percent of the maximum dry density as determined by ASTM D1557.

D. Do not use cohesionless, granular material as earth embankment backfill, unless otherwise shown or required.

3.06 COMPACTION EQUIPMENT

A. Equipment and Methods: Perform all compaction with suitable approved equipment and methods.

B. Compact clay and other cohesive material with sheep's-foot rollers or similar equipment where practicable. Use hand held pneumatic tampers elsewhere for compaction of cohesive fill material.

C. Compact low cohesive soils with pneumatic-tire rollers or large vibratory equipment where practicable. Use small vibratory equipment elsewhere for compaction of cohesionless fill material.

D. Do not use heavy compaction equipment over pipelines or other structures, unless the depth of fill is sufficient to adequately distribute the load.

3.07 FINISH GRADING

A. Final Contours: Perform finish grading in accordance with the completed contour elevations and grades shown on the Contract Drawings and blend into conformation with remaining natural ground surfaces.
   1. Leave all finished grading surfaces smooth and firm to drain. Areas shall be finished to the degree obtainable by either blade or scraper operations and suitable for application of topsoil.
   2. Bring finish grades to elevations within plus or minus 0.10 foot of elevations or contours shown.
   3. Areas which are anticipated to be undisturbed for a period of more than 30 days shall receive temporary seeding of rye grass at a rate of three bushels per acre, weather and season permitting. This seeding shall be repeated as necessary to maintain a continuing ground cover.

B. Surface Drainage: Grade outside of building or structure lines in a manner to prevent accumulation of water within the area. Where necessary or where shown, extend finish grading to ensure that water will be carried to drainage ditches, and the site area left smooth and free from depressions holding water.

3.08 FIELD QUALITY CONTROL

A. Sampling and Testing of Select, Common and Lightweight Backfill: Provide sampling, testing, and laboratory methods in accordance with ASTM D1556 or other method as determined by the Engineer for select fill and common fill. Lightweight fill shall be tested as described in Paragraph 2.06C in accordance with ASTM D698. Subject all backfill to these tests to the satisfaction of the Engineer. These tests shall be the basis for acceptance or rejection by the

Engineer of the compaction. Failure to achieve the specified densities shall require the Contractor to recompact or remove the material as required.

B. Correction of Work:
   1. Correction of Work: Correct any areas of unsatisfactory compaction by removal and replacement, or by scarifying, aerating or sprinkling as needed and recompaction in place prior to placement of a new lift. The Contractor shall, if necessary, increase his compactive effort by increasing the number of passes, using heavier or more suitable compaction equipment, or by reducing the lift thickness. The Contractor shall adjust the moisture content of the soil to bring it to the optimum range by drying or adding water, as required.
   2. Responsibility After Settlement: Correct any depression which may develop from settlement in backfilled areas within one year after the work is fully completed. Provide, as needed, backfill material, pavement base replacement, permanent pavement, sidewalk, curb and driveway repair or replacement, and lawn replacement, and perform the necessary reconditioning and restoration work to bring such depressed areas to proper grade as approved.

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SECTION 02371

DUST, SOIL EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. The Contractor shall provide all labor, materials, tools, equipment, and incidentals required to assure adequate environmental protection including implementation of all erosion and sediment control measures and maintenance of storage areas as directed by the Engineer.

B. The Contractor shall provide an Erosion and Sedimentation Control Plan (E&SCP) that addresses measures to prevent migration of contaminated stormwater, sediment and to prevent erosion of features of the Work.

C. The Contractor shall prevent discharge of sediment or erosion to water courses, public streets or private property from construction activities. The Contractor shall provide methods to prevent construction activities from contaminating stormwater runoff and any adjacent water bodies. Methods of constructing berms, dikes, and/or swales to direct stormwater runoff around the work area to the local drainage system shall be included.

D. The Contractor shall comply with all applicable regulatory requirements and all Federal, State, or local laws, codes, ordinances and regulations which govern the control of sediment, erosion and stormwater during construction activities.

E. The Contractor shall provide Best Management Practices (BMPs) including, but not limited to silt fences, diversion dikes, swales, sedimentation ponds, truck washes/decontamination stations and/or other means as a temporary structural practice to minimize erosion and sediment runoff.

F. The Contractor shall provide and implement dust, erosion, and sediment control and stormwater pollution prevention in accordance with the New York State Pollutant Discharge Elimination System (“SPDES”) Program and the NYSDEC SPDES General Permit GP-0-20-001 for Stormwater Discharges from Construction Activities.

G. The Contractor shall control dust caused by operation and movement of vehicles and equipment in accordance with the latest OSHA standards, and all other applicable Federal, State and local regulations.

H. Related Sections
   1. Submittal Procedures: Section 01330
   2. Excavation: Section 02316

1.02 REFERENCES

A. New York State Department of Conservation (NYSDEC)
   1. SPDES General Permit for Stormwater Discharges from Construction Activities.
   2. New York State Standards and Specification for Urban Erosion and Sediment Control (Blue Book)

3. Urban/Stormwater Runoff Management Practices
4. New York State Environmental Conservation Rules and Regulations, Title 6, Chapter X, Part 750

1.03 DEFINITIONS

A. Best Management Practices: Physical, structural, and/or managerial practices that, when used singly or in combination, prevent or reduce pollution of water.

B. Commencement of Construction: The initial removal and disturbance of soils and vegetation associated with clearing, grading, excavation, fabrication, or installation activities.

C. Erosion: The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as geological creep, detachment, movement of soil or rock fragments by water, wind, ice, or gravity.

D. Erosion/Sediment Control: Any temporary or permanent measures taken to reduce erosion, control siltation and sedimentation, and ensure that sediment-laden water does not leave the site.

E. Final Stabilization: All soil-disturbing activities at the site have been completed and uniform, vegetative cover with the density of eighty (80) percent has been established and/or equivalent stabilization measures (such as the hydroseed, hydromulch, or geo-textiles) have been employed on all areas not covered by pavement, gravel, rip rap, or permanent structures or occupied by permanent stormwater control measures.

F. Receiving Waters: Bodies of water or surface water systems receiving water from upstream manmade (or natural) streams

G. Sediment: Fragmented material that originates from weathering and erosion of soil, rock or unsolicited deposits, and is transported by, suspended in, or deposited in water or air.

H. Qualified Inspector: A person that is knowledgeable in the principles and practices of erosion and sediment control, including a Professional Engineer license in the State of New York, Certified Erosion, Sediment, and Storm Water Inspector (CPESSI), Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or other NYSDEC endorsed individual(s).

1.04 SUBMITTALS

A. Submit for approval in accordance with Section 01330 items required to establish compliance with this section.

B. Erosion and Sediment Control Plan (E&SCP): The Contractor shall develop and submit to the Engineer for approval, prior to commencement of construction activities, an E&SCP. The E&SCP shall address schedules and measures that will be taken to prevent migration of contaminated stormwater/sediment, and to prevent erosion of features of the Work. The E&SCP shall include the following at a minimum:
   1. Drawings showing:
      a. Details of all applicable BMPs (e.g., silt fence, diversion dike, straw bale berm, decontamination stations, etc.).
      b. Location of all BMP's.

2. Stormwater runoff.
3. Provisions for silt fences and other measures to limit migration of sediments.
4. Provisions for straw bale dikes, swales, berms and silt fences or other measures to prevent contaminant and sediment migration.
5. Diversion of stormwater: The Contractor shall include provisions for controlling stormwater runoff in and around disturbed areas.
6. Soil Storage Area: All details of temporary soil storage to be implemented as specified in this section.
7. Soil Stabilization practices: All details of soil stabilization practices to be implemented, as specified in this section.
8. Provisions for all other applicable Best Management Practices.

1.05 QUALITY ASSURANCE

A. Permits and Regulations:
   1. The Contractor shall obtain all necessary permits and be responsible for implementing the terms and requirements of these permits as needed and for payment of all fees.
   2. The Contractor shall handle all material in compliance with applicable requirements of OSHA and other governing authorities having jurisdiction.
   3. Stabilization. The Contractor shall provide stabilization measures in portions of the site where construction activities have temporarily or permanently ceased as soon as practicable, but no more than 5 days after construction activities have temporarily or permanently ceased. Prior to ground freezing, all disturbed areas where construction activities have temporarily or permanently ceased shall be stabilized. In the event of winter shutdown conditions, prior to shutdown all disturbed areas shall be stabilized and further soil disturbance activities shall be ceased until sufficient ground thaw has occurred. If vegetation is desired, seeding, planting, and/or sodding must be scheduled to avoid die-off from fall frosts and allow for proper germination/establishment.

1.06 ENVIRONMENTAL REQUIREMENTS

A. Soil Stabilization: The stabilization practices to be implemented shall include one or a combination of the following: temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control mats, protection of trees and shrubs, preservation of mature vegetation. Stabilization practices shall be as approved by the Engineer. The Contractor shall record the dates when the major grading activities occur (i.e. clearing and grubbing, excavation, embankment and grading); when construction activities temporarily or permanently cease on a portion of the site; and when stabilization practices are initiated. Except as provided in this specification, stabilization practices shall be initiated as soon as practicable, but no more than 14 days after construction activities have temporarily or permanently ceased.
   1. Unsuitable Conditions: Where the initiation of stabilization measures by the fourteenth day after construction activity temporarily or permanently ceases is precluded by unsuitable conditions caused by the weather. Stabilization practices shall be initiated as soon as practicable after conditions become suitable.
   2. Temporary Inactivity Less than 14 Days: Where construction activity will resume on a portion of the site within 14 days after it temporarily ceases, no stabilization practices will be required.

B. Erosion and Sediment Control: Erosion and Sediment control BMPs shall be operational at all times during the Work, specifically during excavation, backfilling and restoration, and decontamination operations. The sediment and erosion control system shall be capable of

handling stormwater during construction. Damage to excavation slopes and the migration of contaminated soil to downstream areas resulting from storm events shall be repaired or remediated by the Contractor, at the Contractor's expense. Repair or replacement of Erosion and Sediment Control BMPs damaged by storm events shall begin by the day after the end of the storm event and be completed as soon as possible, but not more than 2 days of the storm event during which the damage resulted. Repair or replacement of Erosion and Sediment Control BMPS damaged by construction activities or by wearing shall begin by the day after the damage is discovered and be completed as soon as possible, but no more than 2 days of the inspection during which the damage was discovered.

C. Stormwater: At no time shall the Contractor allow stormwater from soil stockpiling operations, or water from decontamination operations to migrate off of, or percolate into, the ground below the temporary stockpile area or decontamination area, so as to impact non-contaminated areas. The Engineer will monitor any overflow or leakage that occurs, and may at his discretion require the Contractor to perform soil sampling within non-contaminated areas affected by such overflow. Any soils that have been contaminated by such overflow shall be removed, treated and disposed of by the Contractor. All sampling, analyses, treatment and disposal of soils required as a result of overflow on formerly non-contaminated soil shall be performed by the Contractor at no additional cost to the Owner.

1.07 PROJECT CONDITIONS

A. Existing Work: All BMPS (e.g., silt fences, straw bales, swales, sumps, pumps, piping) and other sediment/stormwater controls shall be installed such that other aspects of the Work are not adversely impacted or endangered. All installations shall be subject to the approval of the Engineer.

B. Dust Control: The Contractor shall be responsible for controlling visible dust caused by Work operations and the moving of vehicles and equipment. Dust control shall be implemented when soils are exposed, before, during and after Work activity ceases. Dust control will also be required on the weekends. The Contractor shall apply the application of water or other methods, subject to the Engineer's approval, when visible dust is present on-site, in accordance with the Health and Safety Plan. The use of chemicals for dust control, including calcium chloride, will not be permitted.
   1. All excavation, loading and transport of materials shall minimize the formation of dust and shall conform to Section 02316 - Excavation. To prevent dust generation, application of water to roadways and active work areas shall be utilized as required. The Contractor's operations shall include air monitoring and dust minimization measures, consistent with the Health and Safety Plan (HASP) Specifications.

C. Silt and Sediment Disposal: All silt and sediment which accumulates behind any BMPs used on the site (i.e., straw bale berms or silt fences) shall be removed and disposed of off-site in accordance with all applicable Federal, State and local regulations.

1.08 STORAGE, HANDLING AND REMOVAL

A. The Contractor shall store, handle, and remove material and equipment consistent with requirements of NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activities (Permit No. GP-0-08-001) or latest version.

PART 2 PRODUCTS

2.01 MATERIALS

A. All components/controls must be designed in conformance with the most current version of the technical standard, New York Standards and Specifications for Erosion and Sediment Control and the New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must demonstrate equivalence to the technical standard.

PART 3 EXECUTION

3.01 INSTALLATION

A. All installation of erosion and sediment control BMPs must be consistent with the most current version of the technical standard, New York Standards and Specifications for Erosion and Sediment Control and the New York State Stormwater Management Design Manual. Where erosion and sediment control practices are not designed in conformance with these technical standards, the Contractor must demonstrate equivalence to the technical standard.

B. Maintenance: The Contractor shall maintain the temporary and permanent vegetation, erosion and sediment control measures, and other protective measures in good and effective operating condition consistent with the most current version of the technical standard, New York Standards and Specifications for Erosion and Sediment Control and the New York State Stormwater Management Design Manual.

3.02 CLEANING

A. The Contractor shall clean the site and equipment consistent with requirements of the NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activities.

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SECTION 02446

HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: This Section includes work necessary for construction of the 8-inch high density polyethylene (HDPE) force main sewer, by Directionally Controlled Horizontal Drilling Method.

B. Related Sections:
   1. Submittal Procedures: Section 01330
   2. Backfilling: 02317
   3. Wastewater Force Mains: Section 02536

1.02 SUBMITTALS

A. Submit to Engineer in accordance with Section 01330 shop drawings, product data and information required to establish compliance with this section.
   1. Contractor shall submit a predrill plan to the Engineer depicting the location of the proposed force main relative to the test pits, drill pit locations and sizes, staging areas, existing utility locations and any other obstructions discovered by the Contractor during the field engineering or survey phase of construction.
      a. The Engineer shall review the predrill plan and provide a response to the Contractor prior to the Contractor beginning the installation of the proposed force main.

B. Project Schedule: Submit a detailed schedule of the tasks for each stage or operation involved in the work of this Section. The schedule shall include as a minimum the following major tasks:
   1. Preparatory earthwork operations
   2. Drilling rig mobilization and set-up
   3. Pilot hole drilling
   4. Reaming operations
   5. Pipe pulling operations
   6. Pipe testing operations
   7. Restoration and demobilization

C. At least 15 days prior to mobilizing equipment, submit a detailed installation plan to the Engineer for review. The plan shall include calculations showing anticipated maximum pipe stresses during pulling, required drilling fluid pressures, and safety factors for potential drilling fluid blowout.

D. The composition of the drilling fluids used shall be submitted to the Engineer for review prior to utilization. No fluid shall be utilized that does not comply with Federal, State and Local Environmental Regulations.

E. After completion of the project, furnish a drilling log documenting drill pipe joint lengths, inclination angle, azimuth, right (deviation from design path reference line), elevation, station

number and measured distance for every joint of drill pipe installed. In addition, the radius of curvature for each joint of drill path installed shall be calculated by the Contractor and supplied to the Owner. The bit to probe distance, rig setback and bottom hole assembly length shall also be documented on the drill log, typical of previous projects and provided to by the Owner.

1.03 QUALITY ASSURANCE

A. Qualifications: Provide sufficient evidence of experience in Horizontal Directionally Controlled Drilling and pipe pulling of the type required by this Project.
   1. As a minimum, provide on site at all times during the performance of work of this Section, at least one trained supervisor who has directed a minimum of three (3) projects of this type and scope to completion.

B. The Contractor, or a subcontractor employed by the Contractor, shall have performed a minimum of three (3) directional drilling projects with 2-inch or larger pipe, 600 feet or longer and multiple pipes to be eligible for award of the contract. Documentation of the successful completion of past projects shall accompany the procedure in order for it to be considered for acceptance. The Contractor shall have sole responsibility for any subcontractor utilized on this project.

C. The Contractor shall be responsible to determine soil characteristics in the project area prior to commencing the drilling operation.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. The directional drilling system used shall incorporate the following features:
   1. The system shall be remotely steerable with electronic monitoring of the depth and location. The electronic monitoring system shall be accurate to within +2-inches of the cutting head. The system shall be able to control the depth and direction of the drill pipe within a window equal to 1% across the total length of the bore.
   2. The system shall utilize a fluid cutting process, or a fluid assisted mechanical cutting process using a liquid clay, such as bentonite. This clay shall be totally inert and contain no risk to the environment.
   3. Drilling equipment shall be fitted with a permanent alarm system capable of detecting electric current. The system shall have an audible alarm to warn the operator when the drill head nears electrified cables.
   4. Supply a vacuum truck to empty or recover drilling mud from the sending and receiving pits.
   5. If the machinery and equipment used during the drilling process could damage the plastic pipe or tubing, then padding of the machinery and equipment, or other suitable protective section shall be taken, at no cost to the Owner.

2.02 DRILLING MATERIALS

A. The drilling materials used by the Contractor to aid in the horizontal drilling operations shall be of the Contractor's choosing. However, such products shall comply with Environmental Regulations as applicable to this Project.

B. Drilling Water: Water required for drilling operations is the responsibility of the Contractor to obtain.

C. Drilling Fluids: Drilling fluids used in the drilling operation shall be mixtures of bentonite and water or such other fluids of the Contractor's choosing.
   1. Disposal of such drilling fluids shall be the responsibility of the Contractor and shall be conducted in compliance with all relative environmental regulations, right-of-way and work space agreements and permit requirements.
   2. Minimize to every extent possible, the occasions of inadvertent returns of drilling fluids at locations other than the planned entry and exit points.
   3. Perform disposal of drilling fluids in compliance with all relative environmental regulations.
   4. Perform immediate clean-up of inadvertent drilling fluid returns at all locations where they occur.

PART 3 EXECUTION

3.01 PREPARATION

A. General: Perform the necessary general access earthwork operations as required for the set-up and erection of horizontal drilling equipment at the rigsite.
   1. Verify location and depth of all underground utilities prior to commencement of drilling operation.
   2. Notify all the appropriate local authorities prior to commencing work. Agencies to be notified shall include, but are not limited to, the issuer of the permit (State, County, City, Town, State DOT, State DEC, USCG, etc.), the police departments, fire departments and local schools.
   3. Place silt screening and hay bales in a line surrounding all construction activity at the launching and receiving areas. These items shall be provided to contain spills within the launching and receiving areas. Hay bales and silt screens shall be installed 2-feet away and around the slurry pits.
   4. At all times during the working hours, maintain instrumentation in operation which will accurately locate the pilot hole drilling head, and which will accurately measure the drilling fluid flow discharge rate and pressure.
   5. Engineer shall have access to such instrumentation for observation purposes only.

3.02 INSTALLATION

A. General
   1. Make frequent checks during the drilling operation so that any departure from the required line and grade shall be detected at the outset and corrective measures taken to prevent further deviation.
   2. Field conditions may require that the drilling operation be continued on an around-the-clock basis. In the event the Engineer and/or the Owner orders such uninterrupted operation, any additional costs incurred shall be incurred in the price bid.
   3. Pits shall be backfilled, barricaded and restored with temporary asphalt before leaving work at night for safety. Steel road plates may be used in lieu of the placement of temporary asphalt upon concurrence of the Owner.
   4. Install pipe so that it is not in tension.
   5. All damaged pipe sections shall be removed and replaced by the contractor at his expense.

6. Provide for a remote navigation system capable of accurately tracking the position of the drill, reamer and pipe at all times during the drilling and pull-back operation, in both the vertical and horizontal planes.
7. Maintain depth as defined in the drill profile.
8. The leading six feet (6′) of pipe shall be pulled through the receiving pit and inspected. If any abrasions, gouges or lacerations are present which violate the minimum allowable wall thickness of the pipe as defined below, the bore shall be abandoned at no expense to the Owner.
9. Should the leading six feet of pipe evidence damage as described above, the Contractor, at his option, may pull a sleeve through the bore and insert a new pipe through the sleeve at no cost to the Owner. The sleeve shall have an inner diameter no less than 1-inch greater than the outer diameter of the pipe, and shall have the same DR rating. All required labor and material shall be included and be at the contractor's expense.
10. The Owner shall reserve the right to have the Contractor excavate test holes to examine the condition of the pipe. If the pipe fails the criteria detailed above, the installation shall be abandoned as described herein.
11. Sufficient overlap of plastic pipe shall be provided at tie-in and connection locations to allow for shrinkage of the plastic pipe. The plastic pipe will shrink or expand depending on the temperature difference between the installation temperature of the polyethylene pipe and steady temperature of the surrounding existing soil.
12. One (1) 10 AWG gauge tracer wire shall be installed along with the HDPE pipe. Protect against damage or breakage during the drilling installation. The tracer wire shall be continuous through the bore. Upon testing, if both tracer wires are found not to be continuous, furnish and install new tracer wire at no expense to the Owner.

B. Pilot Hole. The pilot hole shall be drilled along the path indicated on the Drawings and to the following general tolerances.
1. Elevation: Plus zero feet; minus 5 feet.
2. Alignment: Maximum offset 10 feet, provided offset does not encroach on to private property
3. Entry Point Location: The pilot hole shall be at the discretion of the Contractor and approved by the Engineer.
4. Exit Point Location: The pilot hole exit point shall be within plus or minus 5 feet or the target location.
5. Should the pilot hole fail to meet the above requirements, the pilot hole must be redrilled.

C. Reaming. Prereaming operations shall be conducted at the discretion of the Contractor. Reaming operations shall be conducted to reduce the pulling loads imposed on the HDPE piping.

D. Drilling Mud and Cuttings Disposal. Provide for the safe disposal and treatment of drilling mud and cuttings within the limitations of any Federal, State of Local Regulations. Such disposal and treatment work shall be considered incidental to the work.

3.03 PIPE PULLING OPERATIONS

A. HDPE Force Main Pulling. Handle the HDPE pipe in a manner that does not overstress the pipe. Should the pipe be buckled or otherwise damaged, the damaged pipe section (or sections) shall be removed and replaced at no increase in Contract Price. Additional precautions as follows:

1. The Contractor shall be completely responsible for expenses due to pipe staging area site permit acquisition beyond the Owner's land, easements and rights-of-way.
2. The Contractor is solely responsible for construction easements and location of overhead and underground utilities with respect to pipe pulling operations.
3. The maximum allowable tensile load imposed on the HDPE pipe shall be within the limits of the pipe grade and wall section strengths.
    a. The Contractor shall be responsible for determining pulling loads required for his method of installation. Such loads shall be minimized as required to prevent failure of the pipeline during installation.
4. Torsional stress shall be minimized as much as possible by use of swivel type assemblies on the pipeline pull section.
5. Pull section support shall be provided by such means necessary to allow the pipe line to move freely and to prevent damage to the corrosion protection coatings.

3.04 LINE ACCEPTANCE AND TESTING

A. As specified in Section 02536 – Wastewater Force Mains.

3.05 COMPLETION OF DIRECTIONAL DRILLING

A. No additional compensation will be paid for any deviation from the Drawings and Contract Documents at the request of the Contractor. All deviations from the Drawings and Contract Documents must be approved by the Engineer.

B. If the directionally drilled pipeline is not installed or the Contractor is forced to abandon the effort, he will forfeit all payments, along with the applicable surety.

C. Completion and successful testing of the approved pipeline will entitle the Contractor to full payment.

D. In the event of failure to install the directional drilled pipeline, the Contractor shall retain possession of the pipe and remove it from the site. The bore hole beneath land shall be completely filled with grout or sand to prevent future settlement. If the HDPE pipe cannot be withdrawn, it shall be cut off at least 3 feet below the ground and capped with a blind flange. The annular space shall be grouted at no increase in Contract price.

3.06 RESTORATION

A. During the drilling operation, contain drilling mud within the sending and receiving pits and/or specific mud pits excavated for this purpose. All excess flows of mud shall be pumped into a vacuum truck provided for this purpose. If excess mud flows out of the containment pits, the drilling operation shall be shut down, at no expense to the Owner, until the flow of mud is contained within the pits and all excess mud has been cleaned from and removed from the site.

B. During the drilling operations at the launching and receiving slurry collection pits, make all necessary arrangements for the safe and clean collection and removal of slurry. Prior to the slurry reaching within 2-feet to the top of grade, take all necessary precautions to empty the slurry pot and remove the slurry from the construction area. The slurry shall be properly transported and disposed of in accordance with all State and/or Federal requirements.

C. All slurry shall be collected in the excavated slurry pits. Slurry pits shall be excavated only in the launching and receiving areas with a 500 cubic foot minimum capacity or as specified by the Owner's engineer.

D. Upon completion of boring and pipe installation, remove all spoils from the starting and termination pits and dispose of same in a lawful manner at no expense to the Owner. The pits shall then be restored to their original condition.

E. Once directional drilling has been completed, backfill slurry pits in accordance with Section 02317.

END OF SECTION

SECTION 02536

WASTEWATER FORCE MAINS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes: The work specified in this Section consists of constructing the piped wastewater force mains and appurtenances.

B. Related Sections:

1. Manholes: Section 02082.
2. Excavation: Section 02316
3. Backfilling: Section 02317
4. Cast-In-Place Concrete: Section 03300.
5. Grouts: Section 03600.

1.02 REFERENCES

A. American National Standards Institute:
1. ANSI B1.1, Unified Inch Screw Threads.
2. ANSI B16.1, Cast-Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
3. ANSI B16.21, Nonmetallic Gaskets for Pipe Flanges.
4. ANSI B18.2.1, Square and Hex Bolts and Screws, Including Askew head Bolts, Hex Cap Screws, and Lag Screws.
5. ANSI B18.2.2, Square and Hex Nuts.

B. American Society for Testing and Materials.
1. ASTM A 47, Specification for Malleable Iron Castings.
2. ASTM A 48, Specification for Gray Iron Castings.
3. ASTM A 167, Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
4. ASTM A 183, Specification for Carbon Steel Track Bolts and Nuts.
5. ASTM A 240, Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Fusion-Welded Unfired Pressure Vessels.
6. ASTM A 283, Specification for Low and Intermediate Tensile Strength Carbon Steel Plates of Structural Quality.
7. ASTM A 320, Specification for Alloy Steel Bolting Materials for Low-Temperature Service.
8. ASTM A 536, Specification for Ductile Iron Castings.
9. ASTM B 62, Specification for Composition Bronze or Ounce Metal Castings.
10. ASTM B 85, Specification for Aluminum-Alloy Die Castings.
11. ASTM B 371, Specification for Copper-Zinc-Silicon Alloy Rod.
12. ASTM B 438, Specification for Copper-Base Sintered Bearings (Oil-Impregnated).
13. ASTM B 584, Specification for Copper Alloy Sand Castings for General Applications.
14. ASTM C 76, Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

15. ASTM C 923, Specification for Resilient Connectors between Reinforced Concrete Manhole Structures, Pipes and Laterals.
16. ASTM D 1248, Specification for Polyethylene Plastics Molding and Extrusion Materials.
17. ASTM D 1598, Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure.
18. ASTM D 1599, Standard Test Method for Short-Time Hydraulic Failure Pressure of Plastic Pipe, Tubing, and Fittings.
19. ASTM D 2000, Standard Classification System for Rubber Products.
20. ASTM D 2774, Standard Recommended Practice for Underground Installation of Thermoplastic Pressure Pipe.
21. ASTM D 2837, Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
22. ASTM D 3139, Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
23. ASTM D 3261, Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing.
24. ASTM D 3350, Polyethylene Plastic Pipe and Fittings Materials, Spec. for.
25. ASTM F 714, Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.
26. ASTM F 477, Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.
27. ASTM SB800

C. American Water Works Association:
1. ANSI/AWWA C110/A21.10, American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 in. Through 48 in., for Water and Other Liquids.
2. ANSI/AWWA C111/A21.11, American National Standard for Rubber Gasket Joints for Ductile Iron Pressure Pipe and Fittings.
3. ANSI/AWWA C115/A21.15, American National Standard for Flanged Ductile-Iron Pipe With Threaded Fittings.
4. ANSI/AWWA C150/A21.50, American National Standard for the Thickness Design of Ductile-Iron Pipe.
5. ANSI/AWWA C151/A21.51, American National Standard for Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
6. ANSI/AWWA C153/A21.53, American National Standard for Ductile-Iron Compact Fittings for Water Service.
7. ANSI/AWWA C207, Standard for Steel Pipe Flanges for Waterworks Service-Sizes 4 in. Through 144 in.
8. ANSI/AWWA C500, Gate Valves - 3 In. through 48 In. for Water and Other Liquids.
9. ANSI/AWWA C509, Resilient-Seated Gate Valves, 3 Through 12 NPS, for Water and Sewage Systems.
10. ANSI/AWWA C550, Protective Interior Coatings for Valves and Hydrants.
11. ANSI/AWWA C600, Installation of Gray and Ductile Cast-Iron Water Mains and Appurtenances.

D. U.S. Commercial Standard Specification CS 226-59.

1.03 SUBMITTALS

A. Shop Drawings and Product Data: Submit completely dimensioned shop drawings, catalog cuts and such other data as required to provide complete descriptive information for the following:
1. Force Main Pipe and Fittings

2. Piping Specialties
3. Sewage Valve
4. Gate Valves
5. Air Release and Cleanout Chambers

B. Certificates: Submit certified records or reports of results of shop tests, with such records or reports containing a sworn statement that shop tests have been made as specified.
1. Sworn certifications shall bear the seal of a Registered Professional Engineer.
2. Provide manufacturer's sworn certification stating that the pipe will be manufactured in accordance with specified reference standards for each pipe type.

1.04 QUALITY ASSURANCE

A. Design Criteria:
1. Use only one type and class of pipe in any continuous force main between structures, unless otherwise indicated on the Drawings.
2. Use pipe and fittings designed to withstand imposed trench loadings and prevailing site conditions at the various locations.

B. Source Quality Control:
1. Shop Tests: As a condition of the Contract, factory test pipe materials listed in the following table, shall have been performed. Each pipe manufacturer shall have facilities to perform listed tests. The Engineer reserves the right to require the manufacturer to perform such additional number of tests as the Engineer may deem necessary to establish the quality of the material offered for use.

MATERIAL	TEST METHOD	NUMBER OF TESTS
Ductile Iron Pipe	ANSI/AWWA C151/A21.51	As specified in ANSI/AWWA C151/A21.51
Polyethylene Pipe	ASTM D1598	As specified in ASTM D1598

2. Laboratory Tests: The Engineer reserves the right to require that laboratory tests also be conducted on materials that are shop tested. Furnish without compensation, labor, materials, and equipment necessary for collecting, packaging, and identifying representative samples of materials to be tested and the shipping of such samples to the Testing Laboratory. These laboratory tests will be paid for under the Construction Contingency Allowance.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Transport, handle and store pipe materials and precast reinforced concrete manhole components and the associated materials specified herein, in a manner recommended by the respective manufacturers to prevent damage and defects.

1.06 SITE CONDITIONS

A. Environmental Requirements:
1. Keep trenches dewatered until pipe joints have been made and concrete cradle and encasement, if any, have cured.
2. Under no circumstances lay pipe in water or on bedding containing frost.

3. Do not lay pipe when weather conditions are unsuitable for pipe laying work, as determined by the Engineer.

PART 2 PRODUCTS

2.01 PIPE AND FITTINGS

A. Elastomeric Gaskets: For pipe joint gasket material, provide elastomeric gaskets that have been tested as suitable for continuous contact with domestic sewage.

B. Ductile Iron Pipe (DIP): Conforming to ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51 requirements for 350 psi working pressure (to 20 inch diameter).
   1. Wall Thickness Class, Buried Pipe: Class 54
   2. Wall Thickness Class, Exposed Pipe: Class 53 except as noted otherwise on Drawings.
   3. Fittings: Gray iron or ductile iron conforming to ANSI/AWWA C110/A21.10 requirements, rated for 250 psi working pressure.
   4. Rubber-Gasket Push Joints, Buried Pipe: Conforming to ANSI/AWWA C111/A21.11 requirements.
      a. For buried pipe installation, provide either push-on or mechanical joints except where other types of joints are indicated on the Drawings or required by the Specifications.
      b. For buried pipe installation, provide mechanical joints except where other types of joints are indicated on the Drawings or required by the Specifications.
      c. For buried pipe installation, provide push-on joints except where other types of joints are indicated on the Drawings or required by the Specifications.
   5. Restrained Joints: Conforming to applicable provisions of ANSI/AWWA C110/A21.10 and ANSI/AWWA C111/A21.11.
      a. Manufacturers:
         1) United States Pipe & Foundry Company, TR Flex restrained joint, 4 inches to 54 inches.
         2) Clow Corporation, Super-Lock restrained joint.
         3) American Cast Iron Pipe Company, Flex-Ring restrained joint, 4 inches to 36 inches; Lok-Ring restrained joint, 42 inches and larger.
         4) Atlantic States, Push-on restrained joint.
         5) Or Approved Equal
      b. Provide restrained fittings with identical joints as restrained joint pipe in restrained areas.
      c. Valves with mechanical joints in restrained areas to be provided with adaptor pieces with the spigot ends modified to provide a restrained joint, using a welded ring and a second follower gland by restrained bell or restrained spigot ends similar to American MJ Coupled Joint. (Pipe supplier to submit detailed sketch of proposed restraining system for the Engineer's approval).
   6. Flanged Joints, Exposed Pipe: Conforming to ANSI/AWWA C115/A21.15 requirements. Unless indicated otherwise on the Drawings, use flanged joints for pipe and fittings installed inside of structures.
      a. Gaskets: 1/16 in. thick cloth insertion rubber full face type conforming to ANSI B16.21 requirements.
      b. Bolts: Conforming to ANSI B18.2.1 requirements.
      c. Nuts: Conforming to ANSI B18.2.2 requirements.
   7. Retainer Glands: Designed for pipe joint retaining through the use of a follower gland and set screw anchoring devices which impart multiple wedging action against the pipe. The

mechanical joint restraint device shall have a working pressure of at least 250 psi with a minimum safety factor of two to one. Material components as follows:

a. Gland: Manufactured of ductile iron conforming to ASTM A536 requirements. Gland dimensions shall match ANSI/AWWA C111/A21.11 and ANSI/AWWA C153/A21.53.
b. Restraining Devices: Manufactured of ductile iron heat treated to a minimum hardness of 370 BHN. Restraining devices shall incorporate a set screw/twist off nut bolt to insure the proper actuating of the restraining device. The twist off nut shall be designed to come off at the torque limit desired to anchor the restraining device in place on the pipe.
c. Joint Deflection: Retainer Gland joint deflection shall be limited to a two degree maximum. Joint deflection shall be applied before the set screws are torqued.
d. Acceptable Manufacturers:
    1) EBAA Iron, Inc.; Megalug 1100 Series.
    2) Or equal.

8. Pipe and Fitting Lining: Manufacturer's standard cement-mortar lining in accordance with ANSI/AWWA C104/A21.4, single thickness. Lining shall include an asphaltic seal coat to prevent moisture loss in cement-mortar curing sequence.
9. Pipe and Fitting Coating: Manufacturer's standard asphaltic coating, approximately one mil thick in accordance with ANSI/AWWA C151/A21.51, applied to the outside of pipe and fittings.
10. Pipe and Fittings Coating (Special Coating): Factory coated inside and out with 46H-413 Hi-Build Tneme-Tar by Tnemec Company, Inc., or equal. Prepare pipe surfaces according to coating manufacturer's instructions and apply coating 18 to 20 mils minimum dry mil thickness.

C. Flanged Adapters: Fabricated from high strength steel (Style 128), or cast iron (Style 127), and designed for joining DIP plain-end pipe to flanged fittings, valves, and flanged end equipment.
1. The compression-end of the adapter shall have the Dresser-Coupling type pack utilizing a Grade 27 wedge gasket for positive, watertight sealing. The flanged-end shall match the flange of the proposed fitting, valve or equipment connection.
2. Acceptable Manufacturers:
    a. Dresser Manufacturing Division of Dresser Industries, Inc.; Dresser Style 128 and 127.
    b. Rockwell-International.
    c. R. H. Baker & Co., Inc.
    d. Or equal.

D. Polyethylene (PE) Pipe and Fittings: Provide pipe which is permanently marked with manufacturer's trademark, size and ASTM conformance designation.
1. Pipe Design: Conforming to ASTM F714 for SDR 17 performance requirements.
2. Pipe Construction: The polyethylene material shall have a PE 3408 designation and shall conform to ASTM D1248 requirements for a Type III, Class C Category 5, Grade P34 material. Pipe material shall also have a cell classification of 345434C as defined in ASTM D3350, and have a hydrostatic design value basis of 1600 psi when tested in accordance with ASTM D2837.
3. Fittings: Molded from polyethylene compound equal to the compound used in the PE pipe construction. Fabricated fittings shall conform to ASTM D3261, SDR 17 requirements and shall be pressure rated to match the system piping in which they are installed.
4. Joining: Both pipe and fittings joined to one another by thermal butt fusion, saddle fusion, or socket fusion in accordance with procedures developed by the pipe manufacturer.

5. Flanged Joints: PE pipe and fittings joined to other materials by means of flanged connections composed of PE flange (fusion joined to pipe) and type 316 stainless steel back-up rings rated for the same pressure service as the pipe.

2.02 PIPING SPECIALTIES

A. Sleeve Type Pipe Seal: Use sleeve type pipe seal in making a core-drilled connection of piping to existing manholes or structures. Pipe seal construction as follows:
   1. In general, the pipe seal shall conform to the requirements of ASTM C923 and shall incorporate a positive compression fit of the gasket to both the manhole and the pipe.
   2. Acceptable Manufacturers:
      a. Press-Seal Gasket Corp., Concrete Products Supply Co.; PSX Seal.
      b. Or equal.

B. Modular, Mechanical Type Pipe Seal: Use modular, mechanical type pipe seal in making a core-drilled connection of piping to existing manholes or structures. Pipe seal construction as follows:
   1. The seal shall consist of inter-locking synthetic rubber links shaped to continuously fill the annular space between the pipe and the wall opening.
   2. The elastomeric element of the seal shall be sized and selected in accordance with the seal manufacturer's recommendations. Elastomeric element shall conform to ASTM D2000 requirements for EPDM material.
   3. The hardware provided in the seal shall be as recommended by the seal manufacturer for buried service such as will exist at the project site.
   4. Acceptable Manufacturers:
      a. Thunderline Corporation; Link-Seal.
      b. Or equal.

C. Wall Sleeves: Cast gray iron or ductile iron conforming to ANSI/AWWA C110/A21.10 requirements, rated for 250 psi working pressure, and provided with intermediate anchoring flange in center of sleeve.
   1. Joints: Joint requirements shall match that of the connected piping except where indicated otherwise on the Drawings.
   2. Acceptable Manufacturers:
      a. McWane Incorporated
      b. American Cast Iron Pipe Co.
      c. U.S. Pipe and Foundry Co.
      d. Or equal.

D. Flexible Pipe Coupling: Coupling shall consist of a steel middle ring or sleeve, two steel or malleable iron flange or follower rings, two wedge shaped resilient gaskets and sufficient number of track-head bolts and nuts.
   1. Middle Ring or Sleeve: Steel construction conforming to ASTM A283, (Grade A) requirements, fabricated in a true circular section and free of surface defect.
   2. Follower Rings or Flanges: Steel construction conforming to ASTM A47 (Grade 32510) requirements, fabricated in a true circular section and free of surface defect, and tested and sized after welding by cold expanding a minimum of one percent.
   3. Bolts and Nuts: Steel bolt conforming to ASTM A183 requirements, double radius head or buttonhead track type with rolled threads, conforming to ANSI B1.1 requirements; and steel nuts conforming to ANSI B 18.2.2 requirements, American Standard Heavy Dimension Series.

4. Gaskets: Resilient wedge-shaped of synthetic base compound designed for raw sewage and sludge service.
5. Shop Paint: Middle and follower rings shop painted with primer compatible with specified field coat for piping where coupling is located.
6. Acceptable Manufacturers:
   a. Dresser Manufacturing Division of Dresser Industries, Inc.; Dresser Style 38 or 138.
   b. Rockwell-International.
   c. R. H. Baker & Co., Inc.
   d. Or equal.

E. Stainless Steel Pipe Supports: Fabricate pipe supports and pipe straps for exposed piping using Type 316 stainless steel conforming to ASTM A167. Individual pipe support and pipe strap designs are as indicated on the Drawings.
   1. Anchors and Fasteners: Provide drilled-in type expansion anchors incorporating a one-piece stud (bolt) with integral expansion wedges, nut and washer as a UL Listed assembly and meeting physical requirements of Federal Specification FF-S-325, Group II, Type 4, Class 1. Stud of Type 303 or 304 stainless and nut and washer of Type 316 stainless.
   2. Standard Bolts, Nuts and Washers: Type 304 stainless steel conforming to ASTM A320.

F. Cast-In-Place Concrete Products: As specified in Section 03300.
   1. Use H.E.S. concrete materials unless indicated otherwise on the Drawings.

2.03 VALVES

A. General Requirements: Provide valves of the same type by same manufacturer; suitable for the intended service. Markings factory cast on the bonnet or body of each valve shall indicate manufacturer's name or mark, year of valve casting, size of valve, directional flow arrow and designation of working water pressure.
   1. Valve pressure-temperature ratings shall not be less than the design criteria applicable to system components.
   2. Valves shall open to the left (counterclockwise) unless otherwise specified. Valves shall operate by nut, handwheel, lever, floorstand or otherwise as indicated on the Drawings. Operating nuts or wheels shall have cast thereon an arrow indicating the direction of opening. All handwheel operated valves shall be equipped with center square nut to allow for motorized valve exercising.
   3. Provide chain wheels and chains for operating overhead or inaccessible valves.
   4. Provide extension stems with bronze bushed stem guides where required. The unsupported length of extension stems shall not exceed ten feet.
   5. Provide floor stands with valve position indicators where indicated on Drawings.
   6. For wrench operated valves, provide at least one wrench for each type and size valve except where valves are in convenient groups; supply one wrench for each four valves.
   7. Buried valves shall be provided with adjustable two piece valve boxes and provided with extension stems, operating nuts and covers unless otherwise shown or specified. Extension stems shall terminate 12 inches below finished grade.
   8. All bolts, nuts, and studs on or required to connect buried or submerged valves shall be Type 316 stainless steel.
   9. Gasket material and installation shall conform to manufacturer’s recommendations.
   10. Valves and actuators located outdoors but not within a building; within maximum 2-ft. above liquid; in vaults; or where otherwise noted shall be especially designed for submerged service where water may completely submerge the valve and operator. All other units shall be as a minimum weather tight.

11. All materials of construction of the valves shall be confirmed suitable for the application by the valve manufacturer.
12. Valve ends as indicated on the Drawings and unless indicated otherwise shall conform to the following:
    a. Flanged: Conforming to ANSI B16.1, Class 125 or 150 requirements.
    b. Mechanical: Conforming to ANSI A21.11 requirements.
    c. Screw End: Threaded in accordance with ANSI B2.1.
    d. Solder Type: For use in copper tubing lines; conforming to ANSI B16.18 requirements.

B. Non-Lubricated Plug Valves (Straightway Type): Provide valve designed for a minimum working water pressure of 175 psi for valves through 12-inches.
1. Provide non-lubricated eccentric type plug valve with valve body of cast iron conforming to ASTM A 126 Grade B or valve body of semi-steel with coated plug suitable for wastewater service. Provide valve with nickel seat and corrosion resistant bearings.
2. Port areas at least 80 percent of full pipe area.
3. Provide full pressure, drip-tight shutoff, bi-directional valve for pressure in reverse (against plug face) applications.
4. Plug shall be Chloroprene (CR) or resilient facing suitable for application.
5. Shaft seals shall be of the multiple V-ring type and shall be externally adjustable and repackable without removing the actuator or bonnet from the valve under pressure.
6. Provide upper and lower grit seals.
7. Acceptable Manufacturers:
    a. DeZurik; PEC Eccentric Valves.
    b. Val-Matic Valve and Manufacturing Corporation.

C. Sewage Combination Air Valves: Consisting of an air release valve and an air and vacuum valve factory piped into a compact assembly. The combination assembly shall automatically release air, gas or vapor under system operating pressure and shall also allow air to re-enter the system during draining or when a vacuum occurs. Combination valve designs shall feature long bodies and float stem components so that the operating mechanisms are kept free from contact with sewage during operation. Valve construction as follows:
1. Valve Bodies and Covers: Cast iron, conforming to ASTM A48, Class 35 requirements.
2. Inlet Sizes: 2-inches.
3. Air Release Outlet Size: 1 1/2-inch, NPT.
4. Vacuum Discharge/Outlet Size: 1 1/2-inch, NPT.
5. Air Release Valve Maximum Working Pressure: 150 psi.
6. Camlock Connection: Polypropylene
7. Rolling Seal Assembly: Polypropylene / Reinforced Nylon + E.P.D.M. + ST ST
8. Float: Foamed Polypropylene
9. Clamping Stem: Polypropylene / Reinforced Nylon
10. Body: Reinforced Nylon / Stainless Steel SAE 316
11. Domed Nut: Stainless Steel SAE 316
12. O-Ring: BUNA-N
13. Stopper: Polypropylene
14. Spring: Stainless Steel SAE 316
15. Washer: Stainless Steel SAE 316
16. Stem: Stainless Steel SAE 316
17. Body: Stainless Steel SAE 316

18. Clamp: Stainless Steel SAE 316
19. O-Ring: BUNA-N
20. Float: Foamed Polypropylene
21. Ball Valve 1/4 ": Stainless Steel
22. Washer: Stainless Steel SAE 316
23. Base: Stainless Steel SAE 316
24. Backflushing and Cleaning Accessories: Factory assembled to the combination valves and consisting of two inlet shut-off valves, two blow-off valves, two clear water inlet valves, section of rubber hose and quick disconnect couplings.
25. Acceptable Manufacturers:
    a. A.R.I. Flow Control Accessories, Ltd.; Model No. D-025 ST
    b. Or equal.

D. Valve Boxes: Cast iron extension roadway type, three-piece construction, and of screw adjustment design.
1. Boxes shall have 4 1/4-inch minimum shaft diameter and cover marked SEWER.
2. Boxes hot coated inside and out with a tar or asphalt compound.
3. Box design shall be capable of receiving increment cast iron rings to raise the box in the future.

2.04 PRECAST CONCRETE CHAMBERS

A. Air Release and Cleanout Chambers: As specified in Section 02082 for precast concrete manhole components.
1. Sump Frame and Grate: Light duty cast iron construction, conforming to ASTM A48 requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Field Inspection: Inspect each section of pipe and each pipe fitting before laying in conformance with the inspection requirements of the appropriate referenced standard.

B. Rejected Products: Remove rejected Products from the Project site and replace with new Products at no increase in Contract Price.
1. Pipe already laid and later found defective will not be accepted and shall require replacement at no increase in Contract Price.

3.02 PREPARATION

A. General Requirements: Clean piping interior prior to laying pipe and following pipe laying, and keep open ends of piping and pipe attachment openings capped or plugged until actual connection or actual pipe testing.
1. Provide the protective means to prevent water and debris from washing into the pipe.

B. Earthwork: Perform earthwork for force main installation as specified in Sections 02316 and 02317.
1. Bedding materials and concrete work for pipe bedding as specified in Section 02317.

3.03 CONSTRUCTION

A. General Requirements: Use proper and suitable tools and appliances for the proper and safe handling, lowering into trench and laying of pipes.

B. Pipe Laying and Joining: Perform pipe laying and joining in strict accordance with manufacturer's installation instructions, reference standards as included, and such additional requirements as specified herein.
   1. Arrange and pay for pipe manufacturer's representative to be present for first installation of pipe to instruct workmen on proper installation methods.
   2. Make joints absolutely watertight and immediately repair detected leaks and defects. Methods of repair subject to Engineer's approval.
   3. Laying/Joining Ductile Iron Pipe: Installation and joint assembly according to AWWA C600, and as follows:
      a. Pipe Cutting: Where necessary to field cut pipe use approved pipe cutter, milling cutter or abrasive wheel saw.
      b. Push-on Joints: To make ductile cast iron pipe push-on joints, properly seat sealing gasket, evenly and sufficiently lubricate the spigot end of pipe, and fully enter joint until joint line is visible. Make deflection, if required, only after the joint has been assembled properly.
      c. Mechanical Joints: To make ductile iron pipe mechanical joint, position sealing gasket and gland for bolting and then enter the spigot into pipe bell end until joint line is visible. Tighten bolts evenly maintaining approximate distance between gland and face of flange at all points around the socket. Do not exceed pipe manufacturer's specifications for maximum torque applied to bolts.
      d. Flanged Joints: For DIP shall be faced true, fitted with gaskets, and drawn up square and tight to ensure full gasket flow and satisfactory seal.
   4. Joint Restraints: Install on buried DIP at changes in direction of pipe runs, and at terminal ends of pipe runs in accordance with the following table:

DUCTILE IRON PIPE RESTRAINED JOINT DIMENSIONS (In feet of straight pipe for each leg)				
Fitting Type	4 Inch Diameter Pipe	6 Inch Diameter Pipe	8 Inch Diameter Pipe	≥ 10 Inch Diameter Pipe
Plug	25	25	25	25
Tee	25	25	25	25
Lateral	25	25	25	25
90 Degree	25	25	25	25
45 Degree	15	15	15	15
22-1/2 Degree	15	15	15	15
11-1/4 Degree	15	15	15	15

C. Connections of Piping to Existing Manholes or Structures: The Contractor shall remove the existing force main in the manhole at Forest and Prestwick and modify the opening in order to accept the new 8-inch force main by one of the following methods:
   1. Cut-in Opening Utilizing PVC Waterstop and Grout: Cut required opening or openings by such methods so as to prevent cracking and spalling concrete. Make openings of sufficient size to accommodate the pipe with PVC Waterstop installed and one inch of annular grout

space. Grout annular space using Non-Shrink Non-Metallic Grout as specified in Section 03600. Make connection watertight.

2. Core-drilled Opening Utilizing Sleeve Type Pipe Seal: Core-drill the required opening or openings using the proper equipment for the work. Make openings of sufficient size to accommodate the Pipe Seal.
3. Core-drilled Opening Utilizing Modular, Mechanical Type Pipe Seal: Core-drill the required opening or openings using the proper equipment for the work. Make openings of sufficient size to accommodate the Pipe Seal.
4. New Invert Channel: Regardless of the connection to existing manhole option selected, form a new invert channel in the existing manhole base to properly conduct the flow through the existing manhole. Do not permit ground water, surface water or debris to enter the existing facilities through the new connection.

D. Inserting Valve Installation: Perform installation of the valves in accordance with the installation instructions/training by and under the direct supervision of the valve manufacturer's field supervisor.
   1. Preparation: Perform the required preparatory work prior to the arrival of the field supervisor, including the necessary excavation, excavation support work, valve foundation work, pipeline stabilizing and bracing work, and providing on-site the equipment and machinery required to place the valve and parts, and to operate the inserting machine.
   2. Installation: The Contractor's crew shall perform the valve installation with the valve manufacturer's field supervisor providing "hands-on" guidance on how to assemble the valve and how to operate the inserting equipment. Nothing contained in these Contract Documents shall imply the valve manufacturer's field supervisor as being party to this Contract.

E. Setting Valves and Boxes:
   1. Unless otherwise directed by the Engineer, set valves and boxes truly vertical.
   2. Set valve and boxes neatly to grade and in such a way that the box does not transfer shock or stress to the valve. Exercise care to center the box over the wrench nut of the valve.

3.04 PRECAST CONCRETE CHAMBER CONSTRUCTION

A. Air Release and Cleanout Chamber Installations: As specified in Section 02082 for precast concrete manholes and as indicated on the Drawings.

3.05 FIELD QUALITY CONTROL

A. General Requirements: Conduct tests specified herein so that each force main installed in the Project is tested to the Engineer's satisfaction.
   1. The leakage tests of the force mains or sections thereof for acceptance, shall be conducted after the backfilling of the trenches has been completed.
   2. Provide tools, materials (including water), apparatus and instruments necessary for force main testing.
   3. When the length of the force main exceeds 1000 feet, test the force main in sections, the length of each section to be determined by the Engineer.
   4. Conduct tests of every kind in the presence of and to the satisfaction of the Engineer.

B. Testing Equipment: Use testing apparatus equipped with a control panel with necessary piping, control valves and gauges to control pressures within the piping test section, and to monitor pressures throughout the test.

1. To prevent accidental overloading of piping test section, provide testing apparatus with an approved pressure relief device set to relieve at 10 psig.
2. Provide an extra pressure gauge of known accuracy to frequently check test equipment and apparatus.
3. Testing equipment and associated testing apparatus subject to Engineer's approval.

C. Cleaning Prior to Tests: Before tests are conducted, flush piping with clean water until free of all forms of dirt and construction debris.
   1. The water for the flush cleaning operation shall be from the Contractor's source.

D. Line Acceptance Test: After a force main or section thereof is constructed, backfilled, and successfully cleaned, perform a hydrostatic Line Acceptance Test as follows:
   1. Seal force main at both ends of the pipe with a suitable pipe plug.
   2. Fill force main with clear water.
   3. Contractor shall remove air from the force main through clean-outs, air relief valves or, if necessary, the Contract shall install a temporary means of relieving the air from the force main. Any temporary means of relieving the air shall be removed after testing is acceptable.
   4. Raise hydrostatic pressure to 100 psi; measured at the low point of the particular section of force main sewer being tested.
   5. A preliminary test period for the removal or absorption of air from the lines before measuring the leakage will be permitted.
   6. Maintain test pressure for a period of not less than two hours.
   7. Consider force main “acceptable” when measured leakage does not exceed ten gallons per day per mile per inch of pipe diameter.
      a. Leakage shall be measured based on the amount of water, in gallons, required to bring the force main back up to 100 psi.

E. Repair and Retest: When force main or sections of force main fails to meet test requirements specified previously, determine source or sources of leakage and repair or replace defective material, and if a result of improper workmanship, correct such.
   1. Conduct such additional tests required to demonstrate that force main meets specified test requirements.

F. Owner’s Tests: The Owner reserves the right to retest at its expense, any piping throughout the duration of the Construction Period.
   1. Make repairs as Work of this Section to piping found defective by such Owner conducted tests.

END OF SECTION

SECTION 02700

ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Asphaltic concrete paving, including the wearing and binder courses.

B. Related Sections
1. Submittals: Section 01300
2. Quality Control: Section 01660
3. Transportation and Handling: Section 01610
4. Recycled Concrete Aggregate Base Course: Section 02721

1.02 REFERENCES

A. AI MS-2 - Mix Design Methods for Asphalt Concrete and Other Hot Mix Types.

B. AI MS-8 - Asphalt Paving Manual.

C. ASTM D242 - Mineral Filler for Bituminous Paving Mixtures.

D. ASTM D546 - Test Method for Sieve Analysis of Mineral Filler for Road and Paving Materials.

E. Nassau County Highway Specs – latest version

1.03 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01300, shop drawings, factory test reports, product data, certified letters of compliance and information required to establish compliance with this section.

B. Supplier: Submit name of asphalt supplier to be used on the project prior to placement of any asphalt on the project.

C. Design Data: Submit asphalt mix design for each asphalt type to be used.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 01610.

B. Deliver asphalt in sealed metal containers covered with suitable material to protect the asphalt from the elements.

C. Lightly lubricate the inside surface of the container with a thin oil or soap solution before loading asphalt.

D. All containers must be cleaned of all foreign materials prior to loading.

1.05 ENVIRONMENTAL REQUIREMENTS

A. Do not place asphalt when base surface temperature is less than 40 degrees F (4 degrees C), or if surface is wet or frozen.

B. Do not place asphalt when precipitation is occurring.

PART 2 PRODUCTS

2.01 MATERIALS

A. Asphalt Cement: AC-20; homogeneous, and shall not foam when heated to 347º F.

B. Fine Aggregate: Material passing the 1/8-inch sieve; natural sand of hard, strong, durable particles which are free from coatings or injurious amounts of clay, loam or other deleterious substances.

C. Coarse Aggregate: Material retained on the 1/8-inch sieve; crushed stone or gravel; clean, durable, sharp angled fragments of rock of uniform quality.

D. Mineral Filler: ASTM D242, finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter; 100 percent shall pass the No. 30 sieve; a minimum of 85 percent shall pass the No. 80 sieve; and a minimum of 65 percent shall pass the No. 200 sieve as measured in accordance with ASTM D546.

2.02 EQUIPMENT

A. Pavers: Equipped with a vibratory device.

B. Rollers: Minimum weight of 10 tons (89 kN) equipped with lubricating devices for the roller wheels.

2.03 ACCESSORIES

A. Tack Coat: Homogeneous, medium curing, liquid asphalt.

B. Wheel Lubricant: Oil-water mixture containing maximum 10 percent lubricating oil.

2.04 MIXES

A. Use dry material to avoid foaming. Mix uniformly.

B. Base Courses:
1. Aggregate for permanent pavement base course shall consist of crushed stone conforming to the requirements of the County Standard Specification and the following gradation:

Screen Size	% Passing
1-1/2 in	100
1-in	90-100
1/2-in	65-85

3/8-in	55-75
#4	40-55
#8	30-45
#16	22-36
#30	16-27
#50	12-19
#100	7-13
#200	3-8

2. Aggregate for temporary access road base course shall consist of limestone screenings. Stone screenings shall be limestone and may be crusher run provided 100 percent passes a 1/2-inch screen, 15 percent to 35 percent passes a #20 screen and 5 percent passes a #200 screen. Screenings need not be washed provided they contain no clay, loam, or other deleterious material. Screenings shall be from stone that passes the abrasion and soundness tests described under the County Standard Material Specification M4 Coarse Aggregate.

C. Pavement:
1. Permanent: Provide a two-course wearing surface for permanent pavement, consisting of a binder course and a top course. Binder course shall conform to the County Standard for Bituminous Concrete Binder Course. Top course shall conform to the County Standard for Bituminous Concrete Type 1A (Flat Process) Top Courses.
2. Temporary: Provide a one course-wearing surface for temporary pavement, consisting of a top course as specified above.

D. Tack Coat: Tack coat shall be an asphalt emulsion conforming to the County Standard Material Specification M5 Bituminous Materials, Material Designation RS-1.

E. Pavement Markings: Pavement markings shall be installed at locations shown on the Drawings. Pavement markings shall be white, thermoplastic reflectorized type conforming to Section 727-01 of the New York State Department of Transportation, Design and Construction Division, Standard Specifications, Construction and Materials, latest revision.

2.05 SOURCE QUALITY CONTROL

A. Obtain asphalt materials from same source throughout the project.

B. Provide asphalt in accordance with the approved County Standard Specification.

C. Test samples in accordance with AI MS-2.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing substrate and conditions.

B. Verify that compacted subbase is dry and ready to receive work of this Section.

C. Verify gradients and elevations of base are correct.

D. Verify that all castings are properly installed and are at the correct elevations.

E. Beginning of installation means installer accepts existing conditions.

3.02 PREPARATION

A. Apply tack coat at uniform rate of 0.03 to 0.07 gal/sq yd to contact surfaces of curbs, gutters and any asphalt or concrete material.

B. Do not apply tack coat to wet or frozen surfaces.

C. Coat surfaces of manhole and catch basin frames with oil to prevent bond with asphalt pavement. Do not tack coat these surfaces.

3.03 INSTALLATION

A. Install work in accordance with AI MS-8.

B. Maintain asphalt temperature between 250- and 325-degrees F during placement.

C. Place asphalt within 24 hours of applying tack coat.

D. Place asphalt to compacted thickness as identified on plans. If a multiple course pavement is to be used, place top course within 24 hours of placing bottom course. If more than 24 hours elapse, a tack coat will be required to be placed over the entire surface of the bottom course prior to any additional paving.

E. Utilize the vibratory device on the paver at all times.

F. Compact pavement by rolling. Do not displace or extrude pavement from position. Hand compact in areas inaccessible to rolling equipment.

G. Compact pavement to a minimum of 94% maximum density.

H. Develop rolling with consecutive passes to achieve even and smooth finish, without roller marks.

I. Seal all joints between new pavement and existing pavement with asphalt cement.

3.04 TOLERANCES

A. Maximum Variation from Flatness: 1/8 inch measured with 10-foot straight edge.

B. Maximum Variation from Scheduled Compacted Thickness: 1/8 inch.

C. Maximum Variation from True Elevation: 1/4 inch.

3.05 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01450.

B. Take samples and perform tests in accordance with AI MS-2.

C. Testing to include percent compaction, graduation and asphalt content.

D. Provide an asphalt thermometer for determining the asphalt temperature during paving operations.

E. Frequency of Tests: One test for every 1,000 square feet of each pavement course.

F. Field quality control laboratory tests and coordination with the testing lab shall be the Contractor's responsibility and be included in the price as bid.

3.06 PROTECTION

A. Protect finished work under provisions of Section 01721.

B. Immediately after placement, protect pavement from mechanical injury until date of substantial completion.

END OF SECTION

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SECTION 02720

PORTLAND CEMENT CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete curbs, gutters, driveway aprons, ADA ramps and sidewalks.

B. Formwork.

C. Related Sections
1. Submittal Procedures: Section 01300
2. Quality Control: Section 01660
3. Delivery, Storage and Handling: Section 01610
4. Project Record Documents: Section 01720
5. Recycled Concrete Aggregate Base Course: Section 02721

1.02 REFERENCES

A. ACI 301 - Structural Concrete for Buildings.

B. ANSI/ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.

C. ANSI/ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

D. ASTM C33 - Concrete Aggregates.

E. ASTM C94 - Ready Mix Concrete.

F. ASTM C150 - Portland Cement

G. ASTM C260 - Air-Entraining Admixtures for Concrete.

H. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

I. ASTM C494 - Chemical Admixtures for Concrete.

J. Nassau County Highway Specs – latest version

1.03 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01300, shop drawings, factory test reports, product data, certified letters of compliance and information required to establish compliance with this section.

B. Product Data: Provide data on joint filler, admixtures, curing compounds, and welded wire fabric reinforcement and reinforcement accessories.

C. Supplier: Submit name of concrete supplier prior to the placement of any concrete on the project.

D. Design Data: Provide a design mix for each type of concrete used on the project.

E. Certificates: Submit receipts of all concrete deliveries indicating source, date, contractor, amount of concrete, concrete strength, truck number and time truck left plant.

1.04 PROJECT RECORD DOCUMENTS

A. Submit under provisions of Section 01720.

B. Accurately record locations of each day's concrete pour.

1.05 QUALITY ASSURANCE

A. Ready-Mix Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities" (Quality Control Manual - Section 3, "Plant Certification Checklist").
   2. Obtain material from the same supplier throughout the duration of the project.

B. Engage a qualified testing agency to perform material evaluation tests and to design concrete mixtures.

C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

D. Perform work in accordance with ACI 301.

1.06 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 01610.

B. Deliver concrete in accordance with ASTM C94, Alternative No. 2.

C. Place all concrete within 2 hours of time truck leaves the batching plant.

1.07 ENVIRONMENTAL REQUIREMENTS

A. Do not place concrete when base surface temperature is less than 40 degrees F, or if surface is wet or frozen.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C150 Air Entraining - Type II Portland type, gray color.

B. Normal-Weight Aggregates: ASTM C 33, No. 57 or No. 67, uniformly graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: Material retained on the 1/8 in (3.2 mm) sieve; crushed stone or gravel; clean, durable, sharp-angled fragments of rock of uniform quality.
2. Fine Aggregate: Material passing the 1/8 in (3.2 mm) sieve; natural sand of hard, strong, durable particles which are free from coatings or injurious amounts of clay, loam or other deleterious substances. Free of materials with deleterious reactivity to alkali in cement.

C. Water: Potable, not detrimental to concrete.

D. Mineral Filler: ASTM D242, finely ground particles of limestone, hydrated lime or other mineral dust, free of foreign matter; 100 percent shall pass the No. 30 (0.60 mm) sieve; a minimum of 85 percent shall pass the No. 80 (0.18 mm) sieve; and a minimum of 65 percent shall pass the No. 200 (0.075 mm) sieve as measured in accordance with ASTM D546.

E. Welded Steel Wire Fabric: Plain type, ANSI/ASTM A185; in flat sheets; uncoated finish.

2.02 ACCESSORIES

A. Steel Forms: Minimum 16 gauge thick, stiffened to support weight of concrete with a minimum deflection.

B. Plywood Forms: Douglas Fir species; solid one side grade; sound, undamaged sheets.

C. Joint Filler: ANSI/ASTM D1751; 1/2 inch thick.

D. Air Entrainment Admixture: ASTM C260.

E. Chemical Admixture: ASTM C494, type as required.

F. Curing Compound: ASTM C309, Type 2, Class A.

G. Form Release Agent: Colorless material which will not stain concrete or absorb moisture.

2.03 MIXES

A. Concrete shall be mixed and prepared in accordance with the approved mix design and ASTM C94, Alternative No. 2.

B. The mix design shall be such that the concrete shall attain the following characteristics:
1. Compressive Strength (28 days): 4,000 psi.
2. Slump: 2-1/2 to 3-1/2 inches.
3. Air Entrainment: 6%±1%.

C. Use chemical admixtures only when approved by Engineer. Use of admixtures will not relax placement requirements.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate.

B. Verify compacted granular subbase has been properly placed and is ready to receive work of this section.

C. Verify gradients and elevations of base are correct.

D. Beginning installation means installer accepts existing conditions.

3.02 PREPARATION

A. Moisten base to a minimum depth of 1/2 inch to minimize absorption of water from fresh concrete.

B. Coat surfaces of manhole and catch basin frames with oil to prevent bond with concrete pavement.

C. Notify Engineer minimum 24 hours prior to commencement of concreting operations.

D. Place and secure forms to correct location, dimension, and profile.

E. Assemble formwork to permit easy stripping and dismantling without damaging concrete.

3.03 INSTALLATION

A. Place welded wire fabric reinforcement as indicated on the plans and/or as required. Interrupt reinforcement at expansion joints.

B. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

C. Clean reinforcement of loose rust and mill scale, earth, ice, or other bond-reducing materials.

D. Arrange, space, and secure welded wire fabric to hold reinforcement in position during concrete placement. Maintain minimum cover to reinforcement.

E. Place joint filler vertical in position, in straight lines. Secure to formwork during concrete placement.

F. Place concrete in accordance with ACI 301.

G. Ensure reinforcement, inserts, embedded parts and formed joints are not disturbed during concrete placement.

H. Place concrete continuously between predetermined construction joints. Do not break or interrupt successive pours such that cold joints occur.

I. Vibrate concrete adjacent to forms.

J. Place expansion and contraction joints as indicated on the plans.

K. Place joint filler between paving components and building or other appurtenances.

L. Provide keyed joints as indicated

M. Saw cut contraction joints 3/16-inch wide at an optimum time after finishing at the locations shown on the plans. Cut 1/3 into depth of slab.

N. Apply a light broom finish perpendicular to vehicular traffic.

O. After initial floating, tool edges of paving, gutters, curbs, driveway aprons, sidewalks and joints in concrete with an edging tool to a ¼-inch radius. Repeat tooling of edges after applying surface finishes. Eliminate edging-tool marks on concrete surfaces.

P. Place curing compound on exposed concrete surfaces immediately after finishing. Apply in accordance with manufacturer's instructions.

Q. Cold Weather Placement: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing, or low temperatures. Comply with ACI 306.1 and the following:
   1. When air temperature has fallen to or is expected to fall below 40 deg F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 deg F and not more than 80 deg F at point of placement.
   2. Do not use frozen materials or materials containing ice or snow.
   3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in design mixtures.

R. Hot Weather Placement: Comply with ACI 301 and as follows when hot-weather conditions exist:
   1. Cool ingredients before mixing to maintain concrete temperature below 90 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 in total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

S. Fog-spray forms and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.04 FIELD QUALITY CONTROL

A. Perform field inspection and testing under provisions of Section 01660.

B. Make six (6) concrete test cylinders for each 50 cubic yard or fraction thereof.

C. For each set of test cylinders taken, test slump, air content, and concrete temperature. Concrete not meeting requirements will be rejected.

D. Cure test cylinders on site under same conditions as concrete they represent.

E. Perform compressive strength tests. Test one specimen at seven days and two specimens at 28 days.

F. Concrete represented by cylinders that do not meet required strength will be removed and replaced at no additional cost to the Owner.

3.05 PAVING TOLERANCES

A. Comply with tolerances in ACI 117 and as follows:
   1. Elevation: 3/4 inch
   2. Thickness: Plus 3/8 inch, minus 1/4 inch.
   3. Surface: Gap below 10-foot- long, unleveled straightedge not to exceed 1/2 inch.
   4. Joint Spacing: 3 inches.
   5. Joint Width: Plus 1/8 inch, no minus

3.06 PROTECTION

A. Immediately after placement, protect pavement from premature drying, excessive temperatures and mechanical injury.

B. Comply with ACI 306.1 for cold weather protection and with ACI 305.1 for hot weather protection.

C. Protect pavement from damage until project is accepted by the Owner.

END OF SECTION

SECTION 02721

RECYCLED CONCRETE AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Recycled concrete aggregate base course.

B. Related Sections
   1. Submittal Procedures: Section 01300
   2. Delivery, Storage and Handling: Section 01610
   3. Backfilling: Section 02317 - Compacted fill under base course
   4. Asphaltic Concrete Paving: Section 02700 - Placing asphalt over aggregate base course

1.02 REFERENCES

A. ANSI/ASTM C88 - Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate.

B. ANSI/ASTM C136 - Sieve Analysis of Fine and Coarse Aggregates.

C. ANSI/ASTM D1557 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures using 10 lb. Rammer and 18-inch Drop.

D. ASTM D2922 - Test Methods for Density of Soil and Soil Aggregate Mixtures in Place by Nuclear Methods (Shallow Depth).

E. ASTM D4318 - Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils.

1.03 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01330, shop drawings, factory test reports, product data, certified letters of compliance and information required to establish compliance with this section.

B. Submit a sieve analysis for the aggregate base course used.

1.04 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Section 01610.

B. Do not handle aggregate in any manner that will cause segregation of large or fine particles.

PART 2 PRODUCTS

2.01 MATERIALS

A. Aggregate Base Course: Angular, crushed, recycled concrete; free of organic matter and deleterious material; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing
2 inches	90-100
1/4 inch	30-65
No. 40	5-40
No. 200	0-10

B. Material retained on the 1/2-inch sieve is coarse aggregate.

C. Coarse aggregate shall not have more than 10 percent by weight of flat or elongated pieces. A flat or elongated piece is defined as being three times greater in the largest dimension as compared to its least dimension.

D. The portion of the aggregate base course which passes the No. 40 screen shall have a plasticity index of one as tested in accordance with ASTM D4318.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and substrate.

B. Verify elevations of subgrade are as indicated on the plans.

C. Verify that subgrade is properly compacted and ready to receive work of this section.

3.02 PREPARATION

A. Fine grade and compact subgrade to 95 percent maximum dry density in accordance with ANSI/ASTM D1557.

3.03 AGGREGATE PLACEMENT

A. Spread aggregate base course over prepared subgrade to a total compacted thickness as indicated on the plans.

B. Place aggregate in 3-inch layers and compact by roller.

C. Level and contour surfaces to elevations and gradients indicated on Drawings.

D. Add small quantities of fine aggregate to coarse aggregate as appropriate to assist compaction.

E. Compact placed aggregate materials to achieve 95% maximum dry density when compacted in accordance with ANSI/ASTM D1557.

F. Add water to assist compaction. If excess water is apparent, remove aggregate and aerate to reduce moisture content.

G. Use mechanical vibrating tamping in areas inaccessible to compaction equipment.

H. Place new pavement on the properly compacted aggregate base course within 24 hours of final compaction. If aggregate base course is left open for more than 24 hours, re-compact and re-test in accordance with ANSI/ASTM D1557 or ASTM D2922.

3.04 TOLERANCES

A. Maximum Variation from Flatness: ¼ inch measured with 10-foot straight edge.

B. Maximum Variation from Scheduled Compacted Thickness: ¼ inch.

C. Maximum Variation from True Elevation: 1/4 inch

3.05 FIELD QUALITY CONTROL

A. Field quality control laboratory tests will be paid for out of the cash allowance for testing services. Coordination with the testing lab shall be the Contractor's responsibility and be included in the price as bid.

B. Perform field-testing under provisions of Section 01660.

C. Perform compaction testing in accordance with ANSI/ASTM D1557 or ASTM D2922.

D. If tests indicate work does not meet specified requirements, remove work, replace, and re-test at no cost to the Owner.

E. Frequency of Tests: One test per 1500 sq. ft immediately prior to paving.

END OF SECTION

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SECTION 02934

GRASSING SOLID SODDING

PART 1 GENERAL

1.01 WORK INCLUDED

A. The work specified in this section consists of the establishing of a stand of grass, within the areas indicated on the Drawings, by the furnishing and placing of grass, sod, fertilizing, watering, and maintaining the sodded areas to assure a healthy stand of grass.

1.02 SUBMITTALS

A. A certification of sod quality by the producer shall be delivered to the County ten days prior to use.

PART 2 PRODUCTS

2.01 GRASS SOD

A. Grass sod shall be a Fine Fescue (Festuca sp. and ssp.)/Bluegrass (Poa pratensis) blend and shall be well matted with grass roots. The sod shall be taken up in rectangles, of manually manageable size, shall be a minimum of 2-inches in thickness and shall be live, fresh, and uninjured at the time of planting. It shall be reasonably free of weeds and other grasses and shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. The sod shall be planted as soon as possible after being dug and shall be shaded and kept moist until it is planted.

2.02 FERTILIZER

A. Commercial fertilizers shall comply with the state fertilizer laws.

B. The numerical designations for fertilizer indicate the minimum percentages (respectively) of (1) total nitrogen, (2) available phosphoric acid, and (3) water-soluble potash contained in the fertilizer.

C. The chemical designation of the fertilizer shall be 12-8-8. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container.

2.03 WATER FOR GRASSING

A. The water used in the sodding operations may be obtained from any approved spring, pond, lake, stream, or municipal water system. The water shall be free of excess and harmful chemicals, acids, alkalies, or any substance which might be harmful to plant growth or obnoxious to traffic. Salt water shall not be used.

PART 3 EXECUTION

3.01 PREPARATION OF GROUND

A. The area over which the sod is to be placed shall be scarified or loosened to a suitable depth and then raked smooth from rocks or stones. Where the soil is sufficiently loose, the County, at its discretion, may authorize elimination of ground preparation.

3.02 APPLICATION OF FERTILIZER

A. Before applying fertilizer, the soil pH shall be brought to a minimum range of 6.0 - 7.0.

B. The fertilizer shall be spread uniformly over the area to be sodded at the rate of 500 pounds per acre, by a spreading device capable of uniformly distributing the material at the specified rate. Immediately after spreading, the fertilizer shall be mixed with the soil to a depth of approximately 4-inches.

C. On steep slopes, where the use of a machine for spreading or mixing is not practicable, the fertilizer shall be spread by hand and raked in and thoroughly mixed with the soil to a depth of approximately 2-inches.

3.03 PLACING SOD

A. The sod shall be placed on the prepared surface, with edges in close contact and shall be firmly and smoothly embedded by light tamping with appropriate tools.

B. Where sodding is used in drainage ditches, the setting of the pieces shall be staggered areas, the offsets of individual strips shall not exceed 6 -inches. To prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped to produce a featheredge effect.

C. On steep slopes, the Contractor, if directed by the County, prevent the sod from sliding by means of wooden pegs driven through the sod blocks into firm earth, at suitable intervals.

D. Sod which has been cut for more than 72 hours shall not be used unless specifically authorized by the County after his inspection thereof. Sod which is not planted within 24 hours after cutting shall be stacked in an approved manner and maintained and properly moistened. Any pieces of sod which, after placing, show an appearance of extreme dryness shall be removed and replaced by fresh, uninjured pieces.

E. Sodding shall not be performed when weather and soil conditions are, in the County’s opinion, unsuitable for proper results.

3.04 WATERING

A. The area on which the sod is to be placed shall contain sufficient moisture, as determined by the County, for optimum results. After being placed the sod shall be kept in a moist condition to the full depth of the rooting zone for at least 2 weeks. Thereafter, the Contractor shall apply water as needed until the sod roots and starts to grow until final acceptance of the project.

3.05 MAINTENANCE

A. The Contractor shall, at his expense, maintain the sodded areas in a satisfactory condition until final acceptance of the project. Such maintenance shall include repairing of any damaged areas and replacing areas in which the establishment of the grass stand does not appear to be developing satisfactorily.

B. Replanting or repair necessary due to the Contractor's negligence, carelessness, or failure to provide routine maintenance shall be at the Contractor's expense. Replanting necessary due to factors determined to be beyond the control of the Contractor shall be paid for under the Construction Contingency Allowance.

END OF SECTION

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SECTION 03300

CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 SUMMARY

A. The work specified in this Section consists of designing mix, furnishing, placing, and curing Portland Cement concrete, reinforced and unreinforced, as indicated.

B. Related Sections:
   1. Submittal Procedures: Section 01300
   2. Items to be embedded in concrete are as contained within the Contract Documents. The responsibility for coordinating concrete pours with embedded items rests solely with the Contractor.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):
   1. AASHTO M 182 Burlap cloth made from Jute or Kenaf and Cotton Mats.

B. American Concrete Institute (ACI):
   1. ACI 117; Specification for Tolerances for Concrete Construction and Materials.
   2. ACI 211.1; Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete.
   3. ACI 211.2; Standard Practice for Selecting Proportions for Structural Lightweight Concrete.
   4. ACI 213R; Guide for Structural Lightweight-Aggregate Concrete.
   5. ACI 301; Specifications for Structural Concrete. " Sections 1 through 5 and Section 7, "Lightweight Concrete."
   6. ACI 304R; Guide for Measuring; Mixing, Transporting, and Placing Concrete.
   7. ACI 305R; Guide to Hot Weather Concreting.
   8. ACI 306R; Guide to Cold Weather Concreting.
   9. ACI 308; Standard Practice for Curing Concrete.
   10. ACI 318; Building Code Requirements.
   11. ACI 350R; Environmental Engineering Concrete Structures.

C. American National Standards Institute (ANSI):
   1. ANSI/NSF 61: Drinking Water System Components – Health Effects.

D. ASTM International (ASTM):
   1. ASTM C31; Standard Practice for Making and Curing Concrete Test Specimens in the Field.
   2. ASTM C33; Standard Specification for Concrete Aggregates.
   3. ASTM C39; Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
   4. ASTM C78; Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading).
   5. ASTM C94; Standard Specification for Ready-Mixed Concrete.

6. ASTM C143; Standard Test Method for Slump of Hydraulic-Cement Concrete.
7. ASTM C150; Standard Specification for Portland Cement.
8. ASTM C171; Standard Specification for Sheet Materials for Curing Concrete.
9. ASTM C172; Standard Practice for Sampling Freshly Mixed Concrete.
10. ASTM C173; Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method.
11. ASTM C192; Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory.
12. ASTM C231; Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method.
13. ASTM C260; Standard Specification for Air-Entraining Admixtures for Concrete.
14. ASTM C309; Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
15. ASTM C494; Standard Specification for Chemical Admixtures for Concrete.
16. ASTM C881; Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.
17. ASTM C882; Standard Test Method for Bond Strength of Epoxy-Resin Systems Used With Concrete By Slant Shear.
18. ASTM C989; Standard Specification for Slag Cement for Use in Concrete and Mortars.
19. ASTM D638; Standard Test Method for Tensile Properties of Plastics.
20. ASTM D695; Standard Test Method for Compressive Properties of Rigid Plastics.
21. ASTM D1751; Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types).
22. ASTM D1752; Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction.
23. ASTM E329; Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection.

1.03 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01300, shop drawings, factory test reports, product data, certified letters of compliance and information required to establish compliance with this section.

B. Product Data: Submit manufacturer's descriptive product data and current specifications for the concrete accessories specified herein (admixtures, joint fillers, curing materials, floor hardeners, waterstops, etc.). Include installation instructions.

C. Samples: Submit samples of materials being used when requested by the Engineer including names, sources, and descriptions.

D. Design Mix: Prior to production of concrete, submit for approval, on form attached at the end of this Section, all mix designs proposed for project. Include with the mix design a standard deviation analysis in accordance with ACI 301 Section 4.2 or trial mixture test data proposed in ACI 301 Section 4.2. Use materials in such proposed design mix as specified herein. Make such adjustments in the proposed design mix as directed by the Engineer. Make such adjustments at no increase in contract price.

E. Test Reports:
   1. Submit concrete test reports specified in Part 3, Field Quality Control in this Specification.

F. Certificates:
   1. Furnish the Engineer and local authorities requiring same, certificates originated by the batch mixing plant certifying ready mixed concrete, as manufactured and delivered, to be in conformance with ASTM C94.

G. Delivery Tickets: A delivery ticket shall accompany each load of concrete from the batch plant.
   1. Tickets must be signed by the Contractor's representative, noted as to time and place of pour, and kept in a record at the site. Make such records available for inspection upon request by the Engineer.
   2. Information presented on the ticket to include the tabulation covered by ASTM C94, Section 16, as well as any additional information the local codes may require.

H. Schedule: Submit schedule showing methods, construction joint locations, and sequence of pouring a minimum of 10 days prior to placing concrete.

I. Testing Agency: Submit name and qualifications of Testing Agency to Engineer for approval prior to proceeding with testing.

1.04 QUALITY ASSURANCE

A. Testing Agency: An agency regularly performing work conforming to ASTM E329.

B. Source Quality Control:
   1. Laboratory Tests: Materials stated herein require advance examination or testing according to methods referenced, or as required by the Engineer.
   2. Compression Test Cylinders: For laboratory trial batches, make in accordance with ACI 301. Test to consist of three compression test cylinders for each class of concrete with one broken at seven days and two broken at 28 days; ASTM C192 and ASTM C39.
   3. Flexural Strength Beams: For laboratory trial batches, make in accordance with American Concrete Institute ACI 301. Test to consist of three flexural strength beams (6 x 6 inches) for Class A concrete only, with one broken at seven days and two broken at 28 days; ASTM C192 and ASTM C78. Perform this test for vehicle pavement slabs only.

1.05 PROJECT CONDITIONS

A. ACI Compliance: Cast-in-place concrete work shall conform to ACI 301 except as modified by these Specifications or the Drawings.

B. Concrete Encasement of Pipes: Encase pipes under structures and buildings indicated by the Drawings to be encased in concrete for the full length of the pipe run under the structure.

C. Concrete Encasement of Conduits: Encase conduit runs as indicated and detailed on the Drawings as work of Division 16 - Electrical Sections.

D. Equipment Bases: Construct reinforced concrete bases for equipment and piping under this contract at no increase in contract price.

1.06 SEQUENCING

A. Where other construction work is relative to concrete pours, or must be supported by or embedded in concrete, those performing such related work must be given five days' notice to introduce or furnish embedded items before concrete is placed.

PART 2 PRODUCTS

2.01 MATERIALS

A. Cement:
   1. Portland Cement: ASTM C150 of the following Type:
      a. Type I, Normal.
      b. Type II, Moderate Sulfate Resistance.
   2. Only one brand and manufacturer of approved cement shall be used for exposed concrete.
   3. Cementitious material is a mixture of cement and ground granulated blast –furnace slag (GGBFS).

B. Ground Granulated Blast –Furnace Slag (GGBFS): Conform to ASTM C989, Grade 120, NSF approved for contact with potable water.
   1. Use GGBFS at the rate of 25% (min) to 35% (max) of the total cementitious material.

C. Normal-weight Concrete Aggregates: Process aggregate meeting requirements of ASTM C33 and subject to the following limitations.
   1. Coarse Aggregate Size: Maximum size of coarse aggregate shall not exceed the following requirements but in no case larger than 1½ inches.
      a. One-fifth narrowest dimension between sides of forms within which concrete is to be cast.
      b. Three-fourths of the minimum clear spacing between reinforcing bars.
      c. One-third the slab thickness for unreinforced slabs.
      d. Reduced aggregate concrete containing aggregate with particle size not less than 1/8 inch nor more than 1/2 inch in any dimension and a maximum of 5 percent of particles passing a No. 8 sieve (for use in metal pan stairs only).

D. Lightweight Aggregate: ASTM C 330, 3/4-inch (19-mm) nominal maximum aggregate size.

E. Water: Clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances that may be deleterious to concrete or reinforcement.

F. Crystalline Waterproofing Additive: Add crystalline waterproofing to all concrete used in walls and slabs of water containing structures.
   1. Concrete waterproofing system shall be of the crystalline type that chemically controls and permanently fixes a non-soluble crystalline structure throughout the capillary voids of the concrete. The system shall cause the concrete to become sealed against the penetration of liquids from any direction and protect the concrete from deterioration due to harsh environmental conditions.
   2. Dosage rate to be 2% (Xypex, Sika WT-215 P) 1% (Penetron Admix) of the total cementitious material content. Dosage rate shall be in accordance with waterproofing admixture manufacturer's recommendations. Add crystalline admixture at the batch plant.
   3. Acceptable Manufacturers:
      a. Xypex (www.xypex.com)

b. ICS Penetron (www.penetron.com)
c. Sika WT-215 P

G. Concrete Admixtures:
1. Prohibited Admixtures: Use only non-corrosive, non-chloride admixtures.
2. Provide admixtures produced and serviced by established, reputable manufacturers and use in compliance with manufacturer's recommendations.
3. Admixtures used for areas in contact with potable water shall conform to the requirements of ANSI/NSF 61.
4. Air-Entraining Admixture:
   a. Use a product conforming to requirements of ASTM C260.
   b. Acceptable Manufacturers:
      1) AEA-92; The Euclid Chemical Company.
      2) Sika Air; Sika Corporation.
      3) Micro Air; BASF.
      4) Or approved equal.
5. Water-Reducing Admixture:
   a. Use a product conforming to requirements of ASTM C494, Type A. (Use this for all concrete except where an admixture listed below is used).
   b. Acceptable Manufacturers:
      1) Eucon WR91; The Euclid Chemical Company.
      2) PolyHeed 997; BASF.
      3) Or approved equal.
6. Water-Reducing and Retarding Admixture:
   a. Use a product conforming to requirements of ASTM C494, Type D.
   b. Acceptable Manufacturers:
      1) Eucon Retarder-75; The Euclid Chemical Company.
      2) Plastiment; Sika Corporation.
      3) Pozzolith 200N; BASF.
      4) Or approved equal.
7. High-Range Water-Reducing Admixture:
   a. Use a product conforming to the requirements of ASTM C494, Types A and F.
   b. Acceptable Manufacturers:
      1) Eucon 37; The Euclid Chemical Company.
      2) Sika ViscoCrete 2100; Sika Corporation.
      3) Glenium 7700; BASF.
      4) Or approved equal.
8. Water-Reducing, and Acceleration Admixture: Use a product conforming to requirements of ASTM C494, Types C or E. Not permitted for use in concrete for water retaining structures.
   a. Acceptable Manufacturers:
      1) Accelguard 80; The Euclid Chemical Company.
      2) Pozzutec 20; BASF.
      3) Plastocrete 161 FL, Sika Rapid-1, or Sikaset series; Sika Corporation.
      4) Or approved equal.
9. Store admixtures in a manner to prevent contamination, evaporation, moisture penetration, or damage. Do not use products which have been stored longer than 6 months.
10. Prior to the mix design review by the Engineer, provide written conformance to the specified requirements of the admixture.

H. Preformed Expansion Joint Fillers:

1. Nonextruding and Resilient Bituminous Types (for exterior use in pavements and sidewalks only): ASTM D1751.
2. Sponge Rubber and Cork Type: ASTM D1752.
3. Self Expanding Cork Type: ASTM D1752.
4. Acceptable Manufacturers:
   a. A.C. Horn.
   b. Greenstreak.
   c. Or approved equal.

I. Tongue and Groove Joint Material:
1. Galvanized steel, stay-in-place, keyed form, such as manufactured by Heckmann Building Products, Inc., or approved equal.
2. Use only for slabs in structures that do not retain water.

J. Vinyl Waterstops: Ribbed type manufactured from virgin polyvinyl chloride plastic compound conforming to ASTM C309.
1. 6-inch Waterstop: 6 x 3/8-inch, such as Vinylex Corporation; Cat. No. R6-38.
2. 9-inch Waterstop: 9 x 3/8-inch with center bulb, 1-inch min. to 1.5-inch max. outside diameter; such as Vinylex Corporation; Cat. No. RLB9-38.
3. Acceptable Manufacturers:
   a. Vinylex Corporation (Catalog Nos. as specified above).
   b. Greenstreak.
   c. W. R. Meadows, Inc.
   d. Or approved equal.
4. Retrofit Waterstop: 6 x 3/8-inch with 3-3/16 inch T leg; such as Greenstreak Product No. 609, or approved equal.

K. Injected Vinylester-Based Resin Waterstop:
1. Injection Hose: Multiple use injection hose composed of polyvinyl chloride (PVC) compound with solid core to absorb concrete pressure and lateral openings along each side, at staggered intervals, to ensure a uniform discharge of the injection material.
   a. Outside diameter: 3/4 inch.
   b. Longitudinal internal injection hole diameter: 1/4 inch.
   c. Discharge internal injection hole diameter: 1/8 inch.
   d. Injection hose to be field measured, cut and fabricated complete with reinforced PVC vent ends, color coded connecting nozzles, heat shrink-on sleeves and closure plugs, in strict accordance with the dimensions shown on the plans and as recommended by the manufacturer.
   e. Acceptable Manufacturers:
      1) Fuko Injection Hose, BBZ USA, Inc.
      2) Or approved equal.
2. Injection Material: Solvent free, low viscosity, two-part, water-swelling, acrylate-ester based injection resin.
   a. Non-foaming and acrylamide free.
   b. Increases volume 100% to 200% when in contact with water.
   c. Swelling behavior reversible and not subject to aging.
   d. Passive toward steel and harmless to bitumen, membranes and concrete.
   e. Bonds well to moist surfaces.
   f. Resistant to weak acids, salt solutions, oil, fats, hydrocarbons, alcohol, and alkali.
   g. Acceptable Manufacturers:
      1) Duroseal Inject, BBZ USA, Inc.

2) Or approved equal.

3. Junction Box:
   a. Non-corroding.
   b. Approved for use with potable water.
   c. Complete with cover.

L. Surface Applied Waterstop: A specially formulated joint sealant which swells upon contact with water. Provide waterstop packaged in continuous length coils. Material composition as follows:
   1. Chloroprene rubber and chloroprene rubber modified to impart hydrophilic properties.
   2. Waterstop shall have a coating formulated to inhibit initial expansion due to moisture presence in the fresh concrete.
   3. Size: Dual extrusion design; 10 mm by 20 mm.
   4. Waterstop shall be secured to hardened concrete with the waterstop manufacturer's standard adhesive binder.
   5. Acceptable Manufacturers:
      a. Greenstreak; Hydrotite CJ.
      b. ADEKA; Ultraseal.
      c. Or equal.

M. Curing Materials. Use curing materials that will not stain or affect concrete finish or lessen the concrete strength and comply with the following requirements:
   1. Burlap: Materials conforming to AASHTO M 182.
   2. Sheet Materials: Material conforming to ASTM C171.
   3. Liquid Curing Compound for areas in contact with potable water.
      a. Use curing compounds which are nontoxic and free of taste, odor and complies with low V.O.C. requirements.
      b. Liquid curing compound cannot be used to cure concrete surfaces where concrete will be in contact with potable water unless curing compound is NSF 61 certified or approved.
      c. Where a finish material is to be applied over concrete with architectural finish or coating, provide certification by the product manufacturer stating the curing compound as non-detrimental to the bond of the finish material.
      d. Acceptable Manufacturers:
         1) Atlas Tech Products: Atlas Quantum-Cure NSF.
         2) Or approved equal.
   4. Liquid Curing Compound for areas not in contact with potable water.
      a. Use curing compounds which are nontoxic and free of taste, odor and complies with low V.O.C. requirements.
      b. Where a finish material is to be applied over concrete with architectural finish, provide certification by the product manufacturer stating the curing compound as non-detrimental to the bond of the finish material.
      c. Acceptable Manufacturers:
         1) Atlas Tech Products: Atlas Quantum-Cure NSF.
         2) L&M Cure; L&M Construction Chemicals, Inc. (not NSF 61-certified or approved).
         3) Or approved equal.

N. Chemical Hardener:
   1. Chemically reactive solution materials formulated to harden and densify concrete surface.
      a. Acceptable Manufacturers:

1) Seal Hard; L&M Construction Chemicals, Inc.
2) Or approved equal.

O. Non-Slip (Dry-Shake) Aggregate Surfacer: Aluminum-oxide non-slip aggregate surfacer for dry shake application to fresh concrete.
1. Acceptable Manufacturers:
a. BASF; Frictex
b. Or approved equal.

P. Epoxy Bonding Compound: A high-modulus, low-viscosity, moisture-insensitive epoxy adhesive having the following properties:
1. Compressive Properties, ASTM D695 at 28 days;
a. Compressive Strength: 8,000 psi. min.
2. Tensile Properties, ASTM D638 at 14 days.
a. Tensile Strength: 4,000 psi. min.
b. Elongation at Break: One to three percent.
c. Modulus of Elasticity: 3×10^5 psi.
3. Bond Strength, ASTM C882:
4. Plastic concrete to hardened concrete at 14 days (moist cure): 1,700 psi. min.
5. Mixed epoxy resin adhesive shall conform to ASTM C881, Type II, Grade 2, Class B and C.
6. Acceptable Manufacturers:
a. Sika Corporation; Sikadur 32 Hi-Mod.
b. Euclid Chemical Company; Euco Epoxy #452 MV or #620.
c. Or approved equal.

Q. Epoxy Adhesive (for grouting dowels): Two-component, high-strength, moisture-tolerant epoxy adhesive:
1. Mixed epoxy resin adhesive shall conform to ASTM C881.
2. Acceptable Manufacturers:
a. Hilti HIT-RE 500-SD, www.hilti.com.
b. Simpson XP, www.simpsonanchors.com.
3. Installation:
a. Follow manufacturer's recommendations.

2.02 MIXES

A. Selection of Proportions of Normal Weight Concrete: ACI 211.1.

B. Selection of Proportions of Lightweight Concrete: ACI 211.2.

C. Proportions of Ingredients: Establish proportions, including water ratio on the basis of either laboratory trial mixture tests or standard deviation analysis, with the materials specified herein.
1. Laboratory Trial Mixture Test: ACI 301, Section 4 and ACI 318, Section 5.3.
2. Standard Deviation Analysis: ACI 301, Section 4 and ACI 318, Section 5.3.

D. Water-Cementitious Material Ratio:
1. Class A Concrete shall have a maximum water- cementitious material ratio of 0.42.
2. Class B Concrete shall have a maximum water- cementitious material ratio of 0.55.
3. Proportion Class C Concrete to meet the strength requirement.

E. Slump: Proportion and produce concrete to a slump as indicated below. The slump ranges apply when vibration is used to consolidate the concrete.

	Slump, in.	
Types of Construction	Maximum*	Minimum
Reinforced foundation walls and footings	3	1
Plain footings, caissons, and substructure walls	3	1
Slabs, beams, and reinforced walls	4	1
Building columns	4	1
Pavements and slabs-on-grade	3	1
Mass concrete	2	1

* May be increased 1 in. for methods of consolidation other than vibration.

1. Pumped concrete shall have a 5-inch maximum slump, measured prior to pumping.

2.03 ADMIXTURES

A. Air Entraining: Provide air-entrained concrete for each concrete pour except where indicated otherwise on the Drawings or specified herein. Total air content required as follows:

Maximum-size coarse aggregate, inches	Air content, percent by volume
1½	5 ± 1
3/4 or 1	6 ± 1
3/8 or 1/2	7½ ± 1

B. Water-Reducing Admixture: Unless high temperatures occur or placing conditions dictate a change, use concrete containing a water-reducing admixture.

C. Water-Reducing and Retarding Admixture: When high temperatures occur or placing conditions dictate, the water-reducing admixture (Type A) may be replaced with a water-reducing and retarding admixture (Type D). Notify the Engineer of such change and submit product data prior to placement of concrete.

D. Water-Reducing and Accelerating Admixture: When low temperatures occur or placing conditions dictate, the water-reducing admixture (Type A) can be replaced with a water-reducing and accelerating admixture. Notify the Engineer of such change and submit product data prior to placement of concrete. Water-reducing and accelerating admixture (Type C and E) will not be permitted in concrete for water retaining structures.

2.04 SOURCE QUALITY CONTROL

A. General Requirements: Provide only Class A concrete in the project except for those cases where indicated otherwise on the Drawings or specified otherwise.

1. Where in-ground encasement of piping is required, provide Class B concrete.
2. Where in-ground encasement of conduit runs is required, provide Class C concrete.
3. Where in-ground encasement of dumpster area is required, provide Class D concrete.

B. Classes of Concrete:
1. Class A: 4,500 psi minimum compressive strength at 28 days; 564 pounds per cubic yard minimum cementitious material content.
2. Class B: 3,000 psi minimum compressive strength at 28 days; 517 pounds per cubic yard minimum cementitious material content.
3. Class C: 2,000 psi minimum compressive strength at 28 days; minimum cement content per cubic yard in accordance with current ready-mix plant standard practice.
4. Class D concrete: 5,000 psi minimum compressive strength at 28 days; 2,500 psi minimum compressive strength at 3 days.

C. Specified Flexural Strength at 28 Days:
1. Class A: 603 psi.

D. Use H.E.S. concrete for reaction backings, concrete cradle, and encasement. Provide H.E.S. concrete air entrained with a minimum mix design compressive strength of 3,000 psi at 3 days, and minimum compressive strength of 3,750 psi at 28 days.

PART 3 EXECUTION

3.01 INSPECTION

A. Inspect work to receive cast-in-place concrete for deficiencies which would prevent proper execution of the finished work. Do not proceed with placing until such deficiencies are corrected to the satisfaction of the Engineer.

3.02 PREPARATION

A. Joints:
1. Construction Joints: Only the locations of critical joints throughout the structures are indicated on the Drawings. Select additional joint locations in walls, slabs, and beams subject to the Engineer's approval and meeting the following conditions:
a. Locate such joints to least impair the strength of the structure and near the middle of the span of structural slabs or beams.
b. The horizontal length between wall joints shall not exceed 30 feet in a continuous wall. At corners or other intersections of two or more walls, provide a joint in each wall at a distance less than 15 to 20 feet from the intersection point in all directions.
c. Space construction joints in structural slabs not greater than 30 feet in each direction, although some adjustments, as approved by the Engineer, may be permitted due to column spacing and details.
d. If a beam intersects another beam at a proposed construction joint, offset the joint in the beam a distance equal to twice the width of the beam and provide adequate shear reinforcement as determined by the Engineer.
e. Maximum joint spacing for slabs-on-grade shall not be greater than 20 feet.
f. Provide waterstops in construction joints where such joints are exposed to liquids, in contact with earth, or subject to weather exposure.

g. Place walls and slabs in alternate sections allowing at least two days elapsed time for slabs and five days elapsed time for walls before concrete is placed against an adjacent joint.
h. Submit requests for approval of joint locations ten days prior to scheduled concrete pours. Do not make concrete pours unless joint locations have been approved by the Engineer.
i. No exceptions permitted to the above requirements unless written approval is given by the Engineer.

2. Expansion Joints and Contraction Joints:
   a. Install where indicated on the Contract Drawings.
   b. Do not extend reinforcing or other embedded metal items through expansion and contraction joints except where indicated otherwise on Contract Drawings.
   c. Sawcutting contraction joints will not be permitted.
   d. Provide waterstops in joints exposed to liquids, in contact with earth, or subject to weather exposure.
3. Bonding to New Concrete: Bond fresh concrete with hardened previously poured new concrete in accordance with the following:
   a. Roughen and clean hardened concrete of foreign matter and laitance and dampen with water.
   b. Cover the hardened concrete with a heavy coating of grout to approximately ½-inch thickness. Use grout of same material composition and proportions of concrete being poured except coarse aggregate omitted. Use grout with a slump of 6 inches minimum.
   c. Place new concrete on grout before it has attained its initial set.
   d. Other bonding methods must be approved by Engineer prior to use.
4. Bonding to Existing Concrete: Roughen existing concrete in the area of bonding to produce exposed aggregate and an absolutely uncontaminated concrete surface.
   a. Apply Epoxy Bonding Compound over existing prepared concrete in accordance with manufacturer's instructions.
5. When concreting is to be discontinued for more than forty-five (45) minutes and if the construction plane is to be horizontal, install keyways, waterstops and embed dowels in the concrete before initial hardening. Use keyways and dowels in vertical concrete construction only when indicated or directed by the Engineer. Use waterstops for water retaining structures or structures below grade. Horizontal joints are not permitted in slabs or footings.
   a. Extend dowels placed in joint one splice length into wall and one splice length into next concrete pour.

B. Embedded Items:
   1. PVC Waterstops:
      a. Install in all joints where watertightness is required.
         1) Vinyl Waterstops:
            a) Use ribbed-type waterstops of the following dimensions except as otherwise indicated on the Contract Drawings.
               (1) Expansion joints in new construction: 9 inches wide by 3/8 inch thick, with center bulb.
               (2) Contraction and construction joints: 6 inches wide by 3/8 inch thick; no center bulb.
      b. Use continuous lengths without splices where possible.
      c. Provide factory-formed and tested waterstop corners and intersections leaving only straight butt joint splice in the field.

d. Connect all adjoining waterstops including vertical and horizontal runs to provide a continuous water barrier.
e. Splices:
    1) Strength: Not less than 50% of the mechanical strength of the parent section.
    2) Watertightness: Make equal to that of continuous material.
    3) Heat seal adjacent surfaces in accordance with manufacturer's recommendations using a thermostatically controlled electric source of heat that provides sufficient heat to melt but not to char the material.
f. Adequately support waterstops to prevent displacement and deformity of the waterstops during concrete pours. Maintain two-inch minimum clearance between waterstop and reinforcing steel.
g. Center waterstop on joint with one-half of waterstop width to be embedded in concrete on each side of joint. At expansion joints, keep center bulb unembedded.
h. In substructures and other structures required to be watertight, install waterstops if concreting is discontinued for a sufficient length of time which, in the opinion of the Engineer, may result in seepage cracks in concrete.

2. Injected Vinylester-Based Resin Waterstops:
    a. Install injection hoses and inject vinylester-based resin in strict accordance with the specifications and technical information provided by the manufacturer and as indicated herein.
    b. Installation of injection hoses:
        1) Install in lengths not to exceed 40 feet.
        2) Install in center of walls and slabs as shown on the Drawings. Encase the injection hose and vent ends in not less than 3 inches of concrete.
        3) Attach to the substrate with plastic anchor clips spaced in accordance with the manufacturer's recommendations.
        4) Do not fasten injection hoses to reinforcing steel.
        5) Do not criss-cross any injection hoses. Use reinforced PVC vent ends for crossing over the injection hoses.
        6) Encase reinforced PVC vent ends in a junction box covered with a matching face plate and mounted firmly against the formwork.
        7) Inspect and obtain approval by the Engineer of all installations prior to pouring concrete.
    c. Injection Application:
        1) Prepare injection material in strict accordance with the manufacturer's printed instructions and specifications regarding mixing, injection procedures, application life and equipment requirements.
        2) Inject the sealing material only when ambient temperatures are between 45º F and 100º F.
        3) Injection operations should not begin prior to the normal 28-day concrete curing time period, in order to allow for shrinkage.
        4) Inject vinylester-based resin in accordance with manufacturer's recommendations.
        5) If the injection material penetrates the wall or slab surfaces, wipe clean with water and patch with rapid-setting cement.
        6) After injection is complete, evacuate injection hose with water following the manufacturer's recommended procedure.
    d. Field support by manufacturer: A manufacturer's representative shall be present for the first installation operation and first injection operation and at any other times deemed necessary by the Engineer to ensure proper installation and injection of vinylester-basin resin injection system.

e. If joints are determined to be leaking after water is placed inside structure, drain water from structure and reinject vinylester-based resin in injection hoses within the limits of the leak in accordance with the injection procedures previously described herein.

3. Surface Applied Waterstop Installation: Install surface applied waterstop at such location where indicated on the Drawings.
   a. Install the waterstop in strict accordance with the manufacturer's installation instructions and with respect to the environmental requirements specified therein and substrate preparation.
4. Embedded Pipes and Conduits: Material not harmful to concrete may be permitted to be embedded in concrete upon approval by the Engineer. Items embedded shall satisfy the following:
   a. Maximum outside dimension not greater than one-third the overall thickness of the member in which it is embedded.
   b. Minimum spacing between items not less than 3 widths on center nor 3 inches clear between items.
   c. Item shall not impair strength of member.
   d. Provide 2-inch minimum clearance to face of slab.

C. Anchoring Reinforcement Dowels into Existing Concrete:
1. Drill holes for each dowel to the size and depth indicated on the Drawings with carbide tip bit or star bit. Core drilling will not be permitted. Do not drill into or cut or otherwise damage existing reinforcement bars. If existing reinforcement bars are encountered during the drilling operation, relocate the hole to clear the existing reinforcement as directed by the Engineer.
2. Blow clean each finished hole with an oil free air jet and then flush with a jet of clean water.
3. Immediately prior to the grouting operation, remove all water from the hole and from the walls of the hole.
4. Pump dispensing gun for proper mixture. Insert nozzle and pump epoxy adhesive into the hole and insert reinforcement dowels. Do not retemper grout that has begun to stiffen; discard such grout.

3.03 CONSTRUCTION

A. Production of Concrete
1. Ready-Mixed Concrete:
   a. Batched, mixed and transported in accordance with ASTM C94.
   b. Add admixtures to the mix in accordance with ACI 301.
   c. Plant equipment and facilities conforming to the "Check List for Certification of Ready Mixed Concrete Production Facilities" of the National Ready Mixed Concrete Association.

B. Placing
1. General: Conduct placement work in accordance with ACI 304R and such additional requirements as specified herein.
   a. Complete discharge of the concrete within 1½ hours or before the mixing drum has revolved 300 revolutions, whichever comes first, after the introduction of the mixing water to the cement and aggregates or the introduction of the cement to the aggregates.
2. Preparation:
   a. Prepare formwork in advance and remove snow, ice, water, and debris from within forms.

b. Pre-position reinforcement in advance of concrete pours.
c. Pre-position waterstops, expansion joint materials, anchors, and embedded items in advance of concrete pours.
d. Sprinkle subgrades sufficiently to eliminate water loss from concrete in accordance with ACI 301 Chapter 11.
e. Do not place concrete on frozen surfaces.

3. Conveying:
   a. Handle concrete from mixer to final deposit rapidly by methods which will prevent segregation or loss of ingredients to maintain required quality of concrete.
   b. Do not convey concrete through aluminum or aluminum alloy.
   c. Do not place concrete by pumps or other similar devices without prior written approval of the Engineer.
   d. Placing concrete by pumping methods shall conform to the applicable requirements of ACI 304R, Chapter 9, and ACI 304.2R.
4. Depositing:
   a. Do not drop concrete freely where reinforcing will cause segregation, nor more than four (4) feet.
   b. Deposit concrete in approximately horizontal layers of 12 to 18 inches.
   c. Do not allow concrete to flow laterally more than three feet.
   d. Place concrete at such a rate that concrete which is being integrated with fresh concrete is still plastic.
   e. Do not deposit concrete on concrete which has hardened sufficiently to cause the formation of seams or planes of weakness within sections.
   f. Do not use concrete which has partially hardened or has been contaminated by foreign materials.
   g. Do not subject concrete to procedures which will cause segregation.
   h. Do not place concrete in forms containing standing water.
   i. Make placement within sections continuously to produce monolithic unit.
   j. Do not begin placement of concrete in beams or slabs until concrete previously placed in walls or columns have attained initial set.
   k. Do not bend reinforcement out of position when placing concrete.
5. Consolidation:
   a. Consolidate concrete by vibration, spading, rodding, or other manual methods. Work concrete around reinforcement, embedded items and into corners; eliminate all air or stone pockets and other causes of honeycombing, pitting, or planes of weakness.
   b. Use vibration equipment of internal type and not the type attached to forms and reinforcement.
   c. Use vibrators capable of transmitting vibration to concrete in frequencies sufficient to provide satisfactory consolidation.
   d. Do not leave vibrators in one spot long enough to cause segregation. Remove concrete segregated by vibrator operation.
   e. Do not use vibrators to spread concrete.
   f. Have sufficient reserve vibration equipment to guard against shutdown of work occasioned by failure of equipment in operation.
6. Cold Weather Concreting: Perform cold weather concrete work in accordance with ACI 306R and the following additional requirements.
   a. Provide concrete delivered at the job-site in accordance with the following temperature limitations:

Air Temperature Deg. F	Minimum Concrete Temperature, deg F	
	For sections with least dimension less than 12 in.	For sections with least dimension 12 in or greater
30 to 45	60	55
0 to 30	65	60

b. Provide equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather.
c. Maintain concrete at temperatures listed in Table 1.4.1 of ACI 306R as follows, after the concrete has developed a compressive strength of 500 psi:
   1) slab-on-grade: 2 days.
   2) walls and supported slabs: 3 days.
d. If the strength is not achieved, maintain the minimum temperature an additional 24 hours or until the 500 psi strength is reached.
e. Make additional concrete cylinders to verify strength achievement of 500 psi; however, additional cylinders are not required for every pour, provided concrete temperatures are maintained fairly uniform. Once two sets of cylinders have been broken and a strength of 500 psi is achieved, additional cylinders will not be required, except for random testing as determined by the Engineer.
f. Remove temperature protection after 500 psi is achieved, but in a manner so thermal shock does not occur to the exposed concrete. The removal criteria shall be as stated in ACI 306R.
g. Leave housing, covering, or other protection used in curing intact at least 24 hours after artificial heating is discontinued.
h. Surfaces with which the concrete is to come in contact must be free of frost, snow and ice. Subgrade shall be free of frost. Do not place concrete around any embedment which has a temperature below freezing.
i. If water or aggregate is heated above 100 degrees F, combine water with aggregate in the mixer before cement is added. Do not mix cement with water or with mixtures of water and aggregate having a temperature greater than 100 degrees F.
j. Provide equipment for heating concrete materials and protecting concrete during freezing or near-freezing weather. Do not use foreign materials or materials containing snow or ice.
k. Surfaces with which the concrete is to come in contact with must be free of frost, snow to and ice.

7. Hot Weather Concreting: Perform hot weather concrete work in accordance with ACI 305R and the following additional requirements.
   a. Temperature of concrete delivered at the job-site shall not exceed 90 degrees F.
   b. Cool ingredients before mixing to prevent temperature in excess of 90 degrees F.
   c. Make provisions for windbreaks, shading, fog spraying, sprinkling or wet cover when necessary.
8. Underwater Concreting: In general, perform underwater concreting work in accordance with ACI 304R Chapter 8 and the following requirements:
   a. When permitted by Engineer, foundation concrete may be placed in still water.
   b. Concrete placed in water shall contain an additional twenty percent of cement above the amount specified for the particular class of concrete used. No additional compensation will be allowed for this added cement.
   c. Do not deposit concrete in water which has a temperature below 40º F.
   d. Place the concrete underwater continuously through a tremie pipe. Diameter of the tremie pipe shall be approximately eight times the maximum size of the largest coarse

aggregate. Use seal in pipe to start concrete placement, and keep filled with concrete continuously with the end of the pipe embedded in the placed concrete at all times. If seal is lost, withdraw pipe and reseal and start charging operations again.

e. Protect placed concrete from water motion for at least four days and longer if required.

C. Finishing:

1. General: Finish concrete in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material.
2. Formed Surfaces: Provide one or more of the following finishes to the surfaces of the concrete after removal of forms. The locations where these finishes are required are listed herein or specified on the Drawings. Allowable surface irregularities are designed as either "abrupt" or "gradual." Check gradual irregularities using 10 foot straightedges.
   a. "Rough Form" finish: Surface may include roughness and irregularities not to exceed ½ inch, but tie holes and defects shall be patched.
   b. "Ordinary Wall" finish: Surface that is true and uniform without any conspicuous offsets or bulges. Gradual irregularities not to exceed ½ inch and abrupt irregularities not to exceed 1/4 inch.
   c. "Plywood" finish: Similar to the ordinary wall finish. Construct the surface of the forms using 5/8-inch plywood or boards lined with tempered hardboard not less than 3/16 inch thick. Place the plywood or liner sheets in an orderly and symmetrical arrangement using sheets as large as practicable. Do not use sheets showing torn grain, worn edges, patches of holes from previous use, or other defects which will impair the texture of the concrete surfaces. Remove gradual irregularities exceeding ½ inch and abrupt irregularities exceeding 1/8 inch. Completely remove all fins on the surface. Rub all surfaces which cannot meet these requirements.
   d. "Rubbed" finish: Apply to a freshly hardened "plywood" finish. Complete rubbing within one day of removal of forms. Wet surfaces and rub with a carborundum brick or other abrasive until all form marks, projections, and irregularities have been removed and a smooth uniform surface, texture, and color are produced. Wash the surface clean after rubbing.
3. Unformed Surfaces: In concrete having unformed surfaces, use just sufficient mortar to avoid the necessity for excessive floating. Slope exposed unformed surfaces to provide quick, positive drainage and to avoid puddles in low spots. Unless otherwise noted, set floor drains 1/2 inch below the normal floor elevation and slope floor toward the drain. Slope all surfaces exposed to weather 1/4 inch per foot for drainage unless noted otherwise on Drawings.
   a. "Floated" Finish: After concrete has been placed, consolidated, struck off, and leveled, do not work further until ready for floating. Begin floating when water sheen has disappeared and when the surface has stiffened sufficiently to permit the operation. During or after first floating, check planeness of surface with a ten foot straightedge applied at not less than two different angles. Cut down high spots and fill low spots during this procedure to produce a surface with true planes within 1/4 inch in ten feet as determined by a ten foot straightedge placed anywhere on the slab in any direction. Following straightedge checking, refloat slab immediately to a uniform sandy texture.
   b. "Steel Trowel" Finish: Obtained by working a floated finish with a steel trowel. First troweling shall produce a smooth surface which is relatively free of defects but which may still show some trowel marks. Perform additional trowelings by hand after the surface has hardened sufficiently. Perform final troweling when a ringing sound is produced as the trowel is moved over the surface. Thoroughly consolidate surface by hand trowel operations. Produce finished surface essentially free of trowel marks,

uniform in texture and appearance, with true planes within 1/4 inch in ten feet, as determined by a ten foot straightedge placed anywhere on the slab in any direction.

c. "Broom or Belt" Finish: Immediately after concrete has received a floated finish, give surface a coarse transverse scored texture by drawing a broom or burlap across the surface.

d. "Nonslip" Finish: The surfaces shall be given a "dry shake" application of non-slip aggregate surfacer. The rate of application of such material not to be less than 25 pounds per 100 square feet. Apply in accordance with manufacturer's recommendations.

4. Special Finishes:
   a. Weirs and Overflow Surfaces: Provide "hard steel trowel" finish to surfaces to produce a hard, dense, smooth, surface free of irregularities. Obtain finish by troweling a regular steel trowel finish after the surface has nearly hardened. The hard surface will have a somewhat glossy appearance. The elevation of the weir crest shall be constant along its entire length.
   b. Flumes and Troughs: Provide a "hard steel trowel" finish to the top of bottom slab. Use "plywood" formed finish on side walls, and an "ordinary wall" finish on overhead surfaces. Provide a "rubbed" finish on all surfaces which will not be in contact with water.
   c. Deck Finish: Power or single hand troweling of slab surface followed by a light hair broom drawn across the slab to produce fine shallow scored texture.
   d. Architectural Finishes. Special finishes such as Vinyl Composition Tile, Quarry Tile, Ceramic Tile, or other, when used, shall be as specified herein or on the Drawings.
5. Application for Finishes: Except where the type of finish is indicated on the drawings or under "Special Finish," all concrete surfaces shall be finished as indicated below.
   a. "Rough Form" Finish:
      1) All surfaces to be covered by earth and not exposed to view.
   b. "Ordinary Wall" Finish:
      1) Interior and exterior wall and slab surfaces not exposed to view.
      2) Inside vertical surfaces of tank type structures below an elevation which is 18 inches below normal water surface.
      3) Interior walls of filters below an elevation which is 6 inches below the filter media.
      4) All wall and overhead surfaces or clearwells.
      5) Undersides of slabs which will be covered by architectural ceilings.
   c. "Plywood" Finish:
      1) All surfaces to be painted.
   d. "Rubbed" Finish:
      1) All interior and exterior surfaces exposed to view which are not to be painted.
      2) All exterior surfaces to a point 6 inches below finished ground.
      3) Inside vertical surfaces of tank type structures above an elevation which is 18 inches below normal water surface.
      4) Interior walls of filters to a point 6 inches below filter media.
      5) Equipment pads, pipe supports, etc.
   e. "Floated" Finish:
      1) All unformed surfaces unless otherwise specified.
   f. "Steel Trowel" Finish:
      1) Interior floors of structures except where Architectural Finish is to be applied.
      2) Interior stair treads.
      3) Tops of exposed walls.
      4) Floors of clearwells and basins.

g. "Broom or Belt" Finish:
   1) Sidewalks, exterior ramps and platforms.
   2) Unloading dock platform.
   3) Walkways on the process tanks.
h. "Nonslip" Finish:
   1) Exterior stair treads and landings.
i. Architectural Finishes:
   1) As specifically called for in these Specifications or on the Drawings.

6. Application of Chemical Hardener: Apply to floor surfaces as scheduled on Drawings. Concrete must be a minimum of twenty-eight (28) days old and cured by water or sheet material curing methods.
   a. Concrete surfaces must be clean, dry, and free of residues, oil, wax, sealers, curing compounds, laitance, or other contaminants in order to promote maximum penetration of hardener.
   b. Apply hardener in two applications in accordance with hardener manufacturer's instructions and by such methods as stated in instructions.
   c. Application: Mechanical scrubbers, equipped with brushes, are the preferred method of application for the first coat.
   d. Pour chemical hardener directly from the container onto the surface to be treated, maintaining an application rate of 200 $ft.^2$ per gallon. Scrub chemical hardener into the surface for 15-20 minutes, working all areas evenly.
   e. Apply second coat using sprayers or rollers in accordance with manufacturer's instructions.

3.04 CURING AND PROTECTION

A. General: Immediately after placement and finishing, protect concrete from premature drying, excessive hot or cold temperatures and mechanical injury. Perform curing by water curing, sheet form curing, or liquid membrane forming methods in accordance with ACI 308. Cure concrete continuously for a minimum of seven days at ambient temperatures above 40º F.

B. Hot Weather Curing: See Hot Weather Concreting this Section.

C. Cold Weather Curing: See Cold Weather Concreting this Section.

D. Application of Liquid Curing Compound:
   1. Finishing operations must be completed prior to application. Apply compound as soon as the free water on the surface disappears and no water sheen is visible. Surface shall be capable of taking walking workmen without being marred. Apply compound in two (2) applications.
   2. Do not apply curing compound to construction joint surfaces. Protect exposed reinforcement during application of curing compound. Water cure those areas not coated with compound.
   3. Do not use liquid curing compound when the ambient air temperature during placement and for 24 hours after placement is or will fall below 35 degrees F.
   4. Do not use liquid curing compounds on concrete surfaces which will receive later treatments, such as hardeners, special finishes, protective coating, dampproofing, waterproofing, future grout, grout fill, or coatings.

E. Curing of surfaces to receive Membrane Waterproofing shall be controlled by water fog spraying, water damped coverings, and/or impermeable sheet film cover for the full 7-day

period specified above. All concrete surfaces shall have a minimum cure of 28 days before application of the membrane. The use of liquid membrane-forming curing compounds on these surfaces is prohibited.

F. Finished surfaces and slabs shall be protected from the direct rays of the sun to prevent checking and crazing.

3.05 FIELD QUALITY CONTROL

A. Testing and Inspection:
   1. During the entire period when concrete is being placed, provide testing services by an independent testing laboratory at no cost to the Owner.
   2. The Engineer reserves the right to make any and all tests as he deems necessary during the progress of the work.
   3. Failure of the independent testing laboratory or the Engineer to detect defective work will not prevent rejection when defect is later discovered, nor will it obligate the Engineer for final acceptance.
   4. The Independent Testing Laboratory shall:
      a. Obtain composite samples in accordance with ASTM C172.
      b. Mold and cure three test specimens for each strength test in accordance with ASTM C31 and as follows:
         1) Concrete compression test: Use standard 6 inch x 12 inch cylinders.
         2) Concrete flexural strength: Use 6 inch x 6 inch x 12 inch beams.
         3) Identify each test by number, mix, amount of admixture, origin of sample in the structure, the date the test specimen was made, the date the test specimen was tested, the amount of slump determined, and the compressive and flexural strength test results.
         4) Test Methods:
            a) Compressive strength test: ASTM C39.
            b) Flexural strength test: ASTM C78 ((Required only for slabs-on-grade subject to wheel loads)).
            c) Test one specimen at 7 days for information and test two specimens at 28 days for acceptance. A strength test is the average of the strengths of the two cylinders tested at 28 days.
            d) Perform one strength test for each 50 cubic yards of concrete poured, unless waived by the Engineer, but not less than one test for each structure.
      c. Make slump tests for each truck load upon truck arrival at the job-site and whenever consistency of concrete appears to vary in accordance with ASTM C143.
      d. Make air content tests for each truck load upon truck arrival at the job-site in accordance with ASTM C 231, pressure method, for normal-weight concrete; or ASTM C 173/C 173M, 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.
      e. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
      f. 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.
      g. Prepare and submit all reports required in the various standards and specifications referenced herein.

1) Distribution of reports shall be:
   a) Two copies to the Engineer.
   b) One or more copies, as required, to the Contractor.

h. Immediately notify the Contractor and the Engineer of any test results which do not conform to the Specification requirements.

B. Evaluation and Acceptance:
1. The strength level of the concrete will be considered satisfactory if the averages of all sets of three consecutive strength tests equal or exceed specified strength and no individual strength test result is below specified strength by more than 500 psi.
2. If the concrete fails to meet the specified strength requirements the Engineer may require one or both of the following:
   a. The Engineer shall have the right to order a change in the mix proportions for the remaining concrete being poured.
   b. The Engineer may order tests on the in-place concrete. Testing shall be in accordance with ACI 301 at no increase in contract price.

3.06 REPAIR OF DEFECTIVE CONCRETE

A. Defective Concrete
1. Porous areas, open or porous construction joints and honeycombed concrete will be considered to indicate that the requirements for mixing, placing and handling have not been complied with and will be sufficient cause for rejection of the members of the structure thus affected.
2. Defective work exposed upon removal of forms shall be entirely removed or repaired within forty-eight hours after forms have been removed.
3. Repaired areas will not be accepted if:
   a. The structural requirements have been impaired by reducing the net section of compression members.
   b. The bond between the steel and concrete has been reduced.
   c. The area is not finished to conform in every respect to the texture, contour, and color of the surrounding concrete.
4. If the above requirements are not satisfied or if there are excessive honeycombs or other defects, the Engineer may require that the members of unit involved be entirely removed and satisfactorily replaced at no additional expense to the Owner.
5. The Engineer will determine the extent and manner of action to be taken for the correction of defective concrete as may be revealed by surface defects or otherwise.
   a. Prior to repair of structural defects or defects which impair watertightness (shrinkage cracks, etc.), submit proposed material and repair methods to the Engineer for approval.
6. As soon as the forms have been stripped and the concrete surfaces exposed, remove fins and other projections, fill recesses left by the removal of form ties, and repair surface defects which do not impair structural strength. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete to the satisfaction of the Engineer.
7. Hammer pack tie holes and other small cavities with a stiff mortar of the same material, but somewhat leaner than that in the concrete. Clean the cavity and the area wetted before mortar is placed.
8. Repair and patch defective areas with cement mortar of mix proportions and materials identical to those used in the surrounding concrete. Produce a finish on the patch that is indistinguishable from the surrounding concrete.

9. Where the honeycomb or voids are not excessive and repairs are authorized by the Engineer, chip out the defective areas in a square shape to sound solid concrete with a depth not less than 2 inches. Make edges of cuts perpendicular to concrete surface or slightly undercut to provide a key at the edge of the patch. Before placing cement mortar, thoroughly clean, dampen, and brush coat area to be patched with neat cement grout. Other patching materials may be used if accepted by Engineer in writing prior to start of repair work. The patch should be kept damp for seven days at a temperature above 50°F.

END OF SECTION

FINAL CONCRETE MIX DESIGN SUBMITTAL FORM
(One for each required mix design)

PROJECT: _____ Location: _____
General Contractor:_
Mix design no.: _____ Design strength: _____

USE (Describe *): _
Mix Design Preparation: Based on Standard Deviation Analysis: _____
(check one) or Based on Trial Mixture Test Data: _____

MATERIALS:

Aggregates: (Provide size, type, source, specification)
Coarse: _
Fine: ___

Cement Type/Source: _

Admixtures: (Provide product, manufacturer)
Water Reducer: __
Air Entraining: __
Accelerator: _
Other: __

CONCRETE PROPERTIES

Water/Cementitious Material Ratio: _____
Slump: _____ inches
Entrained Air: _____ %
Density _____ pcf

SPECIFIC GRAVITIES

Fine Aggregate _____
Coarse Aggregate: _____

ADMIXTURES

Accelerator _____ oz. per 100# cement
W. R. _____ oz. per 100# cement
A. E. _____ oz. per 100# cement
Other _____ oz. per 100# cement

MIX PROPORTIONS

	Weight (lbs)	Absolute Volume (cubic feet)
Cementitious Material:	_____	_____
Fine ** Aggregate:	_____	_____
Coarse ** Aggregate:	_____	_____
Water:	_____	_____
Entrained Air:	_____	_____
Other:	_____	_____
TOTAL:	_____	_____

TEST RESULTS SUBMITTAL FORM

METHOD 1 - STANDARD DEVIATION ANALYSIS (ACI 318 Chapter 5):

Number of Test Cylinders Evaluated: ____ Standard Deviation: _____
(Attach Copy of All Test Results)
Mix Designs Proportioned to Achieve Both of the Following:

$f'_{cr} = f'_c + 1.34s =$ _____ psi
$f'_{cr} = f'_c + 2.33s - 500 =$ _____ psi

Actual $f'_c =$ _____ psi ($\leq f'_{cr}$)

Slump = _____ in. Air Content = _____ %

METHOD 2 - TRIAL MIXTURE TEST DATA (ACI 318 Chapter 5):

Age (days)	Mix 1 (comp. str.)	Mix 2 (comp. str.)	Mix 3 (comp. str.)
7			
28			
28			
28 day avg.			

Mix Design Proportioned to Achieve the Following:

$f'_{cr} = f'_c + 1200$ psi (for $f'c \leq 5000$ psi)
or $f'_{cr} = 1.1f'_c + 700$ psi (for $f'c > 5000$ psi)

Slump = _____ in. Air Content = _____ %

REMARKS:_____

Note: Fill in all blank spaces. Use -0- (zero) or N.A. (not applicable). See Design and Control of Concrete Mixtures, Portland Cement Association, for assistance in filling out this form.

SUBMITTED BY:
Ready-Mix Supplier: Name _____
Address: _____
Phone Number: _____

END OF SECTION

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SECTION 03600

GROUTS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:
   1. Requirements for grouts, except for masonry grouts, indicated on the Drawings and required in other Specification Sections.

B. Related Sections
   a. Submittal Procedures: Section 01300
   b. Cast-in-Place Concrete: Section 03300

1.02 REFERENCES

A. American Concrete Institute:
   1. ACI 308, Recommended Practice for Curing Concrete.

B. American Society for Testing and Materials:
   1. ASTM C33, Concrete Aggregates.
   2. ASTM C109, Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)
   3. ASTM C150, Portland Cement.
   4. ASTM C191, Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle.
   5. ASTM C207, Hydrated Lime for Masonry Purposes.
   6. ASTM C404, Aggregates for Masonry Grout.
   7. ASTM C476, Grout for Masonry.
   8. ASTM C596, Drying Shrinkage of Mortar Containing Portland Cement, Measuring.
   9. ASTM C827, Early Volume Change of Cementitious Mixtures.
   10. ASTM C1019, Standard Method of Sampling and Testing Grout.

1.03 SUBMITTALS

A. Submit to the Engineer for approval in accordance with Section 01330, shop drawings, factory test reports, product data, certified letters of compliance and information required to establish compliance with this section.

B. Product Data: Submit manufacturer's descriptive product data and current specifications covering named manufactured products specified in this Section. Include placing instructions. Submit product data for the following:
   1. Non-Shrink Non-Metallic Grout.

C. Design Mix (for Grout Swept in by Mechanism): Prior to production of this grout, submit for approval a design mix indicating materials proportions and water-cement ratio. Use materials

in the proposed design mix as specified herein. Make such adjustments in the proposed design mix as directed by the Engineer. Make such adjustments at no increase in Contract Price.

1.04 QUALITY ASSURANCE

A. Non-Shrink Grout Performance Qualifications: Furnish the grout manufacturer's current independent laboratory test results indicating the grout as non-shrink from time of placement as conforming to the Following:
   1. Indicating no expansion after final set, according to ASTM C 827.
   2. Indicating 4,000 psi strength developed with a trowelable mix within 24 hours, according to ASTM C 109.
   3. Indicating placement time based on initial set of not less than 60 minutes, according to ASTM C 191.

B. Qualifying Test Results: Furnish from the grout manufacturer, test results indicating that in projects of similar scope and size, the effective bearing area was between 95 and 100 percent.

1.05 DELIVERY, STORAGE AND HANDLING

A. General: Comply with requirements of Section 01610.

B. Provide protective covering over materials to prevent moisture damage and contamination of grout materials.

C. Store materials in undamaged condition with seals and labels intact as packaged by manufacturer.

1.06 PROJECT CONDITIONS

A. Environmental Requirements: Protect against high and low temperatures and bad weather in accordance with American Concrete Institute standards for placement of concrete.

PART 2 PRODUCTS

2.01 MATERIALS

A. Sand/Cement Grout - For Process Areas: Provide sand/cement grout composed of the following components:
   1. Portland Cement: Conforming to ASTM C 150, Type II (Sulfate Resistant) cement for grout applications in contact with sewage.
   2. Sand: Conforming to ASTM C 33, fine aggregate.
   3. Aggregate: Provide reduced size aggregate (for Grout Swept in by Process Mechanism) conforming to AASHTO No. 8 size and meeting material quality requirements of ASTM C 33.

B. Water: Potable quality, free from deleterious amounts of acids, alkalis, and organic substances.

C. Non-Shrink Metallic Grout: Use ready-mix product such as Sonneborn Ferrolith G Redi-Mixed, Master Builders Embeco 153 Grout, W. R. Grace & Co. Vibro-Foil, Ferrogrout by L & M Construction Chemicals.

D. Non-Shrink Non-Metallic Grout: Factory premixed material containing no corrosive irons, aluminums, chemicals, or gypsums.
   1. Grouts containing water reducers, accelerators, or fluidifiers shall have no drying shrinkage greater than the equivalent sand cement and water mix as tested per ASTM C596.
   2. Grout shall be nonshrink before initial set and show no expansion after set as tested per ASTM C827.
   3. Initial set of grout not less than 60 minutes per ASTM C191 Test.
   4. Use Type I (Normal) cement in grout formulation.
   5. Acceptable Manufacturer:
      a. Five Star Products, Inc., Five Star Grout
      b. Sonneborn
      c. Master Builders
      d. L & M Construction Chemicals

E. Neat Cement:
   1. Portland Cement: ASTM C150 Type I.
   2. Water: As specified above.

2.02 MIXES

A. Neat Cement:
   1. Use Type I Portland cement (Normal) and water in the same proportions specified in Section 03300 for Class A cast-in-place concrete, but omit the fine and coarse aggregates from the mix.

B. Sand/Cement Grout:
   1. Proportion the proposed design mix using a mixture of Portland cement, fine aggregate, and water in the proportion specified for Class A cast-in-place concrete as specified in Section 03300.
      a. For grout swept in by mechanism, add reduced size aggregate.

C. Non-Shrink Grout: Use ready-mix type requiring only the addition of water. Do not add other materials. Water requirement proportions to conform to manufacturer's specifications for desired mix consistency.

PART 3 EXECUTION

3.01 PREPARATION

A. Preparation of Surface: Clean surfaces to be grouted to be free of oil, grease, laitance, dirt and other contaminants. Remove loose material. Remove rust, paint, and oil from metal components in contact with grout.
   1. Non-Shrink Grout: Perform additional surface preparation in accordance with manufacturer's instructions.

B. Formwork: Use forming procedures that allow proper and complete placement of grout.
   1. Pre-treat wood forms with forming oils so that they do not absorb moisture.
   2. Anchor Support elements of formwork so no movement is possible. Remove supports only after grout has hardened.

C. Grout Mixing: Use power operated mechanical mixer of sufficient capacity to carry out batch mixing without interruption.
   1. Non-Shrink Grout: Mix in accordance with manufacturer's instructions.
   2. Grout (Sand/Cement) - For Process Areas: Mix in accordance with requirements specified for concrete under Section 03300.

3.02 INSTALLATION

A. Placing Grout (Sand/Cement) - For Process Areas; Swept In By Mechanism: Grout indicated on the Drawings to be Swept In By Mechanism shall not be placed until the equipment mechanism is installed and ready for operation.
   1. Following surface preparation, saturate the concrete with water. Remove excess water and brush on a coat of Neat Cement. Place Grout while Neat Cement is wet.
   2. Place Grout in a single pour, starting at the center and working out towards the tank walls. As placing proceeds, slowly operate equipment mechanism striking off the Grout by means of screeds attached to equipment mechanism bottom and so adjusted to provide the proper depth. Use care in filling depressions and removing excess Grout in front of screed blades.
   3. After screeding, straight-edge Grout surface for trueness and consolidate and finish with a wood float.
   4. Score joints at the tank walls to the full depth of the Grout. Sawing of joints after Grout curing is not allowed.
   5. Cure Grout by wet burlap or inundation in accordance with ACI 308. Curing with sealers not permitted.
   6. After curing fill scored joints with joint sealer.

B. Non-Shrink Metallic Grout: Place in unexposed areas or exposed areas where grouting or equipment is subject to heavy vibratory forces. Place in accordance with manufacturer's instructions.

C. Non-Shrink Non-Metallic Grout: Perform grout placement in accordance with recommendations of ACI and manufacturer's published specification for mixing and placing. Place non-shrink non-metallic grout only where indicated on Drawings.

END OF SECTION