TECHNICAL SPECIFICATIONS

SEWER SERVICE EXPANSION AREA - SEWERSHED "K"
VILLAGE OF SAG HARBOR
SUFFOLK COUNTY, NY 11963

GENERAL CONSTRUCTION

TABLE OF CONTENTS

SEWER SERVICE EXPANSION AREA - SEWERSHED "K"
VILLAGE OF SAG HARBOR
SUFFOLK COUNTY, NY 11963

GENERAL CONSTRUCTION

TABLE OF CONTENTS

SECTION 01100 – SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes:

1. Project information
2. Project Milestones
3. Contracts
4. Work Covered by Contract Documents
5. Work Under Separate Contract
6. Work Sequence
7. Use of Premises
8. Specifications and Drawing Conventions
9. Miscellaneous Provisions
10. Contractor’s Responsibility
11. Permits and Licenses
12. Compliance with Laws
13. Accidents
14. Temporary Services
15. Protection of Utilities and Utility Conflicts
16. Protection of Water Supplies
17. Protection of Horizontal Control Monuments and Observation Wells
18. Preservation of Wetlands and Waterways and Hazardous Waste Disposal
19. Sprinkler System
20. Groundwater and Flood Flows
21. Size Limitation for Construction Equipment
22. Construction Limitations
23. Subcontractors
24. OSHA Compliance
25. Project Site Information

B. Related Section:

1. Division 01 Section 01500 "Temporary Facilities and Controls" for limitations and procedures governing temporary use of Owner's facilities.

1.3 PROJECT INFORMATION

A. Project Identification: Project consists of the construction of a new Low Pressure Sewer (LPS) System within the Village of Sag Harbor.

B. Project Location: New LPS System to be routed along the following Village streets: Bridge Street, Spring Street, Garden Street, Howard Street, Long Island Avenue, Roe Street and Meadow Street and will discharge to existing sewer manholes located on Long Island Avenue and Bridge Street.

C. Owner: Village Sag Harbor, Suffolk County, NY.

D. Owner's Representative: Contract Documents prepared by Cameron Engineering & Associates, LLP, 177 Crossways Park Drive, Woodbury, NY 11797, (516) 827-4900.

E. Project Coordinator: General Construction Contractor shall be responsible for coordination of his/her subcontractors and for overall Project coordination.

1.4 PROJECT MILESTONES

A. Project milestones and guidelines shall be met as follow:

1. LPS System shall be 100% complete and fully ready for operation (i.e., installed, tested, commissioned and accepted) within **540** days of the Notice to Proceed date.

2. In addition to liquidated damages, Contractor shall be responsible for any/all costs associated with holding, hauling and disposal of any/all sanitary wastewater generated should the above milestones not be met.

1.5 CONTRACT

A. Project will be conducted under a General Construction Contract.

B. Compensation for all Work required by the Contract Documents shall be included in the Bid Form. The specifications are divided into various sections for clarity and ease of understanding. However, at times, various aspects of the work are described under different sections. Whenever a type of labor, material or construction is necessary, the requirements governing the type of work shall apply regardless of where they may be found in the Contract Documents and regardless of the specific section, title or heading.

1.6 WORK COVERED BY CONTRACT DOCUMENTS

A. Contractor is responsible for loading and unloading of all their equipment, materials, tools and other incidentals and appurtenances related to the Project.

B. The work under the Contract shall include, but not necessarily be limited to, the furnishing of all materials, labor, tools, equipment, and necessary accessories to construct gravity sewer piping in the Village of Sag Harbor, NY as shown in the Contract Documents and as specified herein. In general, the work shall include, but not necessarily be limited to:

1. Construction of a new LPS System, including all new piping, manholes and associated fittings, valves and appurtenances along the following Village streets: Bridge Street, Spring Street, Garden Street, Howard Street, Long Island Avenue, Roe Street and Meadow Street and discharge to existing sewer manholes located on Long Island Avenue and Bridge Street indicated in the Contract Documents and as specified herein.

1.7 WORK UNDER SEPARATE CONTRACTS

A. General: Cooperate fully with separate contractors so work may be carried out smoothly, without interfering with or delaying work under this Contract. Coordinate the work of this Contract with work performed under separate contracts, as required.

1.8 WORK SEQUENCE

A. Contractor shall submit a comprehensive schedule, work sequence, dewatering plans, as required for the Project, to the Owner and Owner's Representative for review. The hours of dewatering shall be approved by the Owner and Owner's Representative.

B. Work sequence shall minimize disruption of normal sewer and stormwater flows. Contractor shall provide all pumps and power for the pumps, piping, valves and appurtenances for bypass of sewer and stormwater flows during the construction activities. Timing of bypass and/or shutdowns shall be approved by the Owner and Owner's Representative.

C. Sequence of construction shall be discussed with Owner and Owner's Representative at the pre-construction meeting and any required subsequent meeting(s) until all parties are in full agreement.

D. Contractor shall submit dewatering permit application to the NYSDEC within fifteen (15) days of Notice to Proceed, where applicable.

1.9 USE OF PREMISES

A. General: Contractor shall provide a designated area for equipment, tool and material storage. Contractor shall provide their own trailer, phone, fax and sanitary facilities.

B. Limit use of the Project Site to the areas within the Work as indicated. Do not disturb portion of the site beyond areas in which the Work is indicated. Contractor and subcontractor personnel shall be restricted to areas that are under construction for the Project. Contractor and subcontractor personnel found outside of the designated construction areas shall be dismissed and prohibited from any further Work at the Plant site.

C. It is the intent of the contract that the Contractor provide sufficient work force(s) at all times during normal business working hours and days of each week to complete the work without resorting to overtime work. This includes working designated work hours for all personnel, regardless of trade. All contractor and subcontractor personnel shall maintain designated lunch and breaks, unless specific work agreed to in advance between Contractor, Owner and Owner's Representative (i.e., concrete pour or other task requiring continuous uninterrupted work to complete) and complete a full 8-hour workday.

D. Do not interrupt utilities serving any facility unless Owner and Owner's Representative are notified a minimum of two (2) days in advance of the utility interruption. Obtain Owner and Owner's Representative written permission before proceeding with utility interruption.

E. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials. Parking shall be in designated areas only. If applicable, Village parking passes must be on display on every vehicle windshield.

F. Schedule deliveries to minimize use of driveways and entrances by construction operations and to minimize space and time requirements for storage of materials and equipment on-site.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative and streamlined language is generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified in the Contract Documents are described in detail in the Specifications. One or more of the following are used in the Contract Documents to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled in the Contract Documents.
3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

1.11 MISCELLANEOUS PROVISIONS

A. Compensation for all work required by the Contract Documents shall be included in the Bid Proposal. These specifications are divided into various sections for clarity and ease of understanding. However, at times, various aspects of the work are described under different sections. Whenever a type of labor, material or construction is necessary, the requirements governing the type of work shall apply regardless of where they may be found in the Contract Documents and regardless of the specific section, title or heading.

1.12 CONTRACTOR’S RESPONSIBILITY

A. Contractor shall do all the work and furnish at his own cost and expense all plant, labor, materials, equipment, and other facilities, except as herein otherwise provided, that may be necessary and proper for performing and completing the work. Contractor shall be

responsible for the entire work until completed and accepted by the Owner.

B. Work shall be performed in accordance with the true intent and meaning of the Contract Documents. Unless expressly provided, all Work must be performed in accordance with the best modern practice, with materials and workmanship of the highest quality, all as determined by, and entirely to the satisfaction of, the Owner and Owner's Representative.

C. Unless otherwise expressly provided, the means and the methods of construction shall be such as the Contractor may choose, subject, however, to review by the Owner and Owner's Representative. Such review, or the Owner and Owner's Representative failure to exercise his right to reject such means and methods thereon, shall not relieve the Contractor of his obligations to accomplish the result intended by the Contract, nor shall the exercise of such right to reject create a cause of action for damages.

D. Lands by Contractor: Any land and access thereto not furnished by the Owner that the Contractor deems necessary for the Contract work, for temporary construction facilities including field offices, access and egress or for storage of materials shall be provided by the Contractor at no cost to the Owner. Contractor shall obtain permits and written approvals from the appropriate jurisdictional agency and property owner for use of premises not furnished by the Owner, and of all offsite areas which include offsite borrow pits and waste areas. Such permits and approvals must specify treatment of said areas during and at the completion of construction. opies of all permits and approvals shall be furnished to the Owner's Representative.

E. Full-time supervision by the Contractor shall be provided at all times.

1.13 PERMITS AND LICENSES

A. Contractor must comply with all local, State, and Federal laws, rules and regulation applicable to this Contract and to the Work to be done hereunder, and he must obtain at his own expense all permits and/or licenses necessary for the prosecution of the Work other than those permits obtained by the Owner. It is the responsibility of the Contractor to discover what permits he needs for this Work.

B. Contractor will be required to procure and use all necessary forms required by State and Federal Agencies. Any cost involved will be sustained by the Contractor.

C. Where permits are issued by New York State for work performed on State Highways, all work performed on or adjacent to State Highways will be supplemented by the requirements of the Specifications of the New York State Department of Transportation, including materials, methods, and workmanship.

D. Any stipulation or requirement of agreements or permits to enter upon or cross lands under jurisdiction of Federal, State, Municipal, or any other authority, whether incorporated or not in this document, is binding on the Contractor.

1.14 COMPLIANCE WITH LAWS

A. Contractor shall keep himself informed of all current Federal, State, Local Laws and Ordinances.

B. The Work shall be performed by the Contractor, in all respects, in strict conformity with all such laws, rules, regulations, requirements and ordinances of the Federal, State and Local governments and all departments and bureaus thereof, and of the National Fire Protection Association. Should the Drawings or the Specifications conflict with the law, Contractor shall immediately notify the Owner's Representative in writing of such conflict, and shall thereafter follow the written instructions of the Owner's Representative in respect thereto; or should the Drawings or Specifications demand more than the law requires, the Drawings and Specifications shall be followed nevertheless.

1.15 ACCIDENTS

A. Accidents resulting in injury or death or which result in property damage must be reported immediately to the Owner and Owner's Representative. Contractor shall make an initial notification either by telephone or facsimile with a formal written report to follow immediately.

B. Contractor shall promptly report in writing to the Owner and Owner's Representative all accidents whatsoever arising out of, or in connection with the performance of the work, giving full details and statements of witnesses.

1.16 TEMPORARY SERVICES

A. Water and Power

1. Contractor shall provide at his own expense all temporary water and electric, as specified herein. Meters shall be provided and read monthly by Contractor, Owner and Owner's Representative. Contractor shall be billed for water and electric at rates paid by Owner.

B. Light and Telephone

1. Contractor shall provide at his own expense all telephone and temporary and security lighting as required for the proper performance and inspection of his work.

C. Sanitary Facilities

1. Contractor shall provide sanitary services/facilities. Contractor shall prohibit and prevent the committing of nuisances on the site of the work or on adjoining property and shall discharge any employee who violates this rule. Ample washroom, toilet facilities, and a potable water supply for use of all employees shall be furnished and maintained by the Contractor in strict conformance with the applicable regulations of the New York State Department of Labor, Board of Standards and Appeals. Field Offices shall be connected to site sewage disposal facilities.

1.17 PROTECTION OF UTILITIES AND UTILITY CONFLICTS

A. A careful search has been made, in good faith, of all known municipally owned or private utilities within or adjacent to the Contract area. However, there is no guarantee that all existing utilities have been found. The location of the utilities as shown on the Contract Plans, are approximate only. The Owner therefore does not guarantee the locations shown on the Plans of pipes, service connections, ducts, utilities, and other underground structures, or

that all such pipes, service connections, ducts, utilities, and other underground structures are shown on the Plans. The information given is intended only as a guide to the Contractor. Contractor is specifically directed to familiarize himself with the existence of aerial, surface, or subsurface structures of municipal and other public service corporations within the Contract Area.

B. Contractor's attention is also directed to the fact that during the life of this Contract, the owners and operators of utilities may make changes in their facilities. Contractor will be required to determine the exact locations and elevations of all pertinent structures, utilities, and facilities, before construction work and new installations are started, so that there will be no interference with the Work. Conflict between existing structures, utilities, and facilities and new Work shall be ascertained by the Contractor and called to the attention of the Owner's Representative. Contractor shall take these conditions into consideration in making up his bid. He shall not claim damages and shall not be entitled to payment because of any omission or faulty location on the Plans or any pipes, ducts, utilities, or other underground structures.

C. It is understood and agreed that the Contractor has considered in his bid all of the permanent and temporary utility appurtenances in their present or relocated positions, 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 or from the operation of moving them.

D. Contractor shall protect in a suitable manner all utilities encountered and shall repair any damage to structures, utilities, and facilities caused by his operations. If the nature of the damage is such as to endanger the satisfactory functioning of the utilities and the 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.

E. Contractor shall give the utility corporations involved and/or Owner reasonable notice, but not less than seventy-two (72) hours, in advance of operations which may or will affect their structures or facilities.

F. Contractor shall cooperate with the municipally owned and/or public utility corporations whose structures (aerial, surface, or subsurface) are within the limits of or along the outside of the trench width, to make it possible for them to maintain uninterrupted service. Contractor shall conduct his operations in such a way as to delay or interfere as little as practicable with the work of the utility corporations.

G. Contractor shall do all work and pay all costs of protecting, supporting, and maintaining all surface, subsurface, or overhead structures, and all other property, including pipes, service connections, conduits, ducts, tubes, chambers, and appurtenances, public or private, in the vicinity of the work (except such which by law, franchise, permit, contract, consent, or agreement the owner thereof is required to protect, support, maintain, relocate, or restore) repairing the same if damaged, and restoring to their original condition all areas disturbed. He shall not claim or be entitled to any damages for delay or otherwise by reason of such required work, and he thereby assumes all risks in connection therewith.

H. In general, it is the intention of the Owner not to order utilities moved; however, where direct conflict is encountered, the Owner's Representative will be contacted for resolution.

Contractor shall not remove any structures or part of a structure owned by any utility corporation without the approval of the Owner's Representative.

I. Contractor will see to it that utility valve boxes and manholes are readily accessible at all times. Contractor will not store materials over them and should it become necessary to cover the boxes or manholes with soil, he will devise a method for finding them quickly and assist the utility company to uncover them. Further, the boxes and manholes will be uncovered during non-working hours.

1.18 PROTECTION OF WATER SUPPLIES

A. Water Supply Interconnections

1. There shall be no physical connection between a public or private potable water supply system and a sewer, or appurtenance thereto which would permit the passage of any sewage or polluted water into the potable supply.

1.19 PROTECTION OF COUNTY HORIZONTAL CONTROL MONUMENTS AND OBSERVATION WELLS

A. Contractor shall verify the locations of all traverse monuments and observation wells and inform the Owner's Representative of any discrepancies. It shall be the responsibility of the Contractor to protect these monuments and observation wells from any and all harm during the life of the Contract. Contractor shall take whatever measures necessary and perform whatever work that is required to afford such protection of the monuments and observation wells to the satisfaction of the Owner's Representative.

1. In the event that monuments are damaged, disturbed, or destroyed in any way by action of the Contractor, then the Contractor shall replace the monuments in exact kind to the accuracy of first order or second order work as required and approved and under the direct supervision of the Owner's Representative.
2. In the event that observation wells are damaged, disturbed, or destroyed in any way by action of the Contractor, Contractor shall provide the Owner with a new observation well of the type and depth and at the location required by the Owner.

B. No payment will be made for costs accruing to the Contractor by reason of this requirement.

1.20 PRESERVATION OF WETLANDS AND WATERWAYS AND HAZARDOUS WASTE DISPOSAL

A. Contractor is not permitted to dump soil onto those areas designated as wetland or waterways. Further, the Contractor shall not stockpile or store soil, materials, tools, or equipment on wetlands.

B. Burning of any materials within the limits of the County will not be permitted.

C. Hazardous waste material encountered during the excavation must be disposed of according to latest Environmental Agency guidelines and at no additional cost to the Owner.

D. Owner shall be supplied with a complete original copy of the manifest and receipt of delivery/disposal from end disposal point/facility of any hazardous waste handled, removed, transported and disposed of that has been generated from this Project. Such documentation shall be complete from "cradle to grave" (i.e., point of origin to final disposal site).

1.21 SPRINKLER SYSTEM

A. If the Contractor in the course of his work removes or damages existing underground lawn sprinkler systems located within the Project site, he shall repair the damage to the sprinkler system or replace it, as directed by the Owner's Representative and at no additional cost to Owner. Failure of the Contractor to repair damages within 14 days of notification by Owner, a penalty of $500.00 per day beyond the 14 days and until such time sprinkler system is repaired to the satisfaction of the Owner will be assessed by the Owner and deducted from the Contractors next payment requisition.

1.22 GROUNDWATER AND FLOOD FLOWS

A. Contractor shall take all necessary precautions and shall furnish any and all labor, equipment, and materials required to handle all water, sewage, storm, seepage, surface, subsurface, and flood flows which may be encountered at any time during construction of the work, and he shall assume all costs connected therewith. The manner of providing for these flows shall be subject to approval of the Owner's Representative.

1.23 SIZE LIMITATION FOR CONSTRUCTION EQUIPMENT

A. Contractor shall limit the size and weight of construction equipment in locations where operation of large and heavy equipment will result in extensive damage to trees, utilities and pavements. If the operation of the equipment selected by the Contractor results in excessive damage to trees, pavements and utilities, Contractor shall replace it with smaller and lighter equipment at the request of the Owner's Representative.

1.24 CONSTRUCTION LIMITATIONS

A. Any impact to nearby residents shall be mitigated to the fullest extent possible. Construction noise, dust, odors and related construction impacts shall be restricted to the governing codes and regulations. If the construction impacts are excessive, as determined by the Owner's Representative, Contractor shall provide alternative construction methods to complete the construction.

B. Owner reserves the right to back charge Contractor for all costs associated with maintaining the Project Site should the Contractor fail to maintain the Project Site in a condition acceptable to the Owner.

C. Contractor shall not stage/store/locate equipment, materials or other construction items that restrict traffic flow. Temporary material staging/storage in the field shall be limited to what can be constructed that day. Provide a traveled way suitable for two (2) lanes of moving traffic at all times. Keep traveled way reasonably smooth and hard at all times. Contractor shall not open roadway beyond what construction can be completed in that day.

D. Noise mitigation for pumping activities may require construction of a temporary insulated enclosure(s) to attenuate and reduce travel of noise off of the Owner's property. If necessary, this shall be done at the Contractor's expense and at no additional cost to Owner.

1.25 SUBCONTRACTORS

A. All subcontractors shall be approved by Owner and Owner's Representative prior to their starting Work on the Project. Background information shall be provided to Owner and Owner's Representative describing the work experience documentation of the subcontractor.

1.26 OSHA COMPLIANCE

A. In addition to the existing prevailing wage rate law, Labor Law §220, section 220-h, confined space training, trench safety training, and lock out/tag out training all laborers, workers and mechanics working on the site shall be required to complete OSHA 10-hour Construction Safety and Health Course S1537-A. All laborers, workers and mechanics working on the site shall be certified as having successfully completed the OSHA 10-hour construction safety and health course. Daily hygiene and hand washing are of paramount importance, as the Work is being conducted at an active wastewater treatment facility.

1.27 PROJECT SITE INFORMATION

A. Limited site soil boring data, samples and soil reports are available for inspection and are for informational purposes only. Any opinions/information expressed in these reports are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner's Representative and Owner shall not be responsible for interpretations or conclusions drawn from this data. Bidders must make their own interpretation of subsurface conditions, including groundwater depth, that may affect methods or the cost of construction of the Work.

B. Contractor shall satisfy himself by actual examination of the site of the Work, as no claim shall be made by the Contractor for additional compensation by reasons of the fact that existing conditions, including groundwater depth, are other than as shown of the Contract Documents.

C. Contractor, at his own expense, shall make test borings or dig test holes to locate and determine the depth to groundwater, including a determination of any seasonal variations. Any/all expenses for making test borings and/or digging test holes and other investigative work shall be borne by the Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01100

SECTION 01105 - PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes a description of specific requirements associated with other contracts.

B. Related Sections:

1. Division 01 Section "Summary" for the Work covered by the Contract Documents, restrictions on use of the Project sites and work restrictions.

1.3 COORDINATION WITH OTHER CONTRACTS

A. During the progress of the Work, other Contractors may be engaged in performing other work and be awarded work under separate contracts. In that event, the Contractor shall coordinate the work to be done hereunder with the work of such other contractors and the Contractor shall fully cooperate with such other contractors and carefully fit its own work to that provided under other contracts as directed by the Owner's Representative.

B. Contractor shall not commit or permit any act which will interfere with the performance of work by any other contractor.

C. If Owner's Representative determines that the Contractor is failing to coordinate his work with the work of other contractors as the Owner's Representative has directed, then the Owner shall have the right to withhold any payments otherwise due hereunder until the Owner's Representative's directions are complied with by the Contractor.

D. If the Contractor notifies the Owner's Representative in writing that another contractor is failing to coordinate his work with the work of this Contract as directed, the Owner's Representative must promptly investigate the charge. If he finds it to be true, he must promptly issue such directions to the other contractor with respect thereto as the situation may be required. The Owner shall not, however, be liable for any damages suffered by this Contractor by reason of the other contractor's failure to comply with the directions so issued by the Owner's Representative, or by reason of another contractor's default in performance, it being understood that the Owner does not guarantee the responsibility or continued efficiency of any contractor.

E. Should the Contractor sustain any damage through any act or omission of any other contractor having a contract with the Owner for the performance of work upon the site or of work which may be necessary to be performed for the proper prosecution of the work to be performed hereunder, or through any act of omission of a subcontractor of such

contract, the Contractor shall have no claim against the Owner for such damage, but shall have a right to recover such damage from the other contractor under the provision similar to the following paragraph, which have been or will also be inserted in the contracts with such other contractors:

1. Should any other contractor having or who shall hereafter have a contract with the Owner for the performance of work upon the site sustain any damage through any act or omission of the Contractor hereunder or through any act or omission of any subcontractor of the Contractor, the Contractor agrees to reimburse such other contractor for all such damages and to defend at his own expense, any suit based upon such claim and if any judgment or claims against the Owner shall be allowed, the Contractor shall pay or satisfy such judgment or claim and pay all costs and expenses in connection therewith and agrees to indemnify and hold the Owner harmless from all such claims.

F. If any portion of the Work to be performed under this Contract depends upon the work of the Owner's forces or any other contractor, the Contractor shall inspect same and promptly give to the Owner's Representative notice of all defects in the work of such other contractor or Owner's forces. Contractor shall further notify the Owner's Representative of all delays by such other contractor as will affect the timely performance of the Work to be performed under this Contract. Failure of the Contractor to so inspect and give notice shall constitute an acceptance by him and an acknowledgement of the timely performance of work by other contractors.

G. Contractor shall notify the Owner's Representative immediately of damage to his Work as a result of work being performed by others through their neglect, ignorance, carelessness or other reasons attributable to the offending contractor.

H. Contractor's attention is specifically directed to the fact that because of the work on other contracts within the limits of this Contract, he may not have exclusive occupancy of the territory within the limits of the Contract. Each contractor shall afford the Owner and separate contractor's reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work and shall connect and coordinate his work with theirs as required by the Contract Documents.

1.4 GENERAL REQUIREMENTS OF CONTRACTS

A. Work under this contract and work under separate contracts shall be closely coordinated to achieve fully operating systems. Project milestones and guidelines shall be met to coordinate the startup, testing, commissioning and sequencing of various systems. Work between the contracts shall be coordinated to provide smooth transition amongst different tasks for each contract. Related construction sequencing shall be coordinated by the Owner and/or Owner's Representative.

B. Use of project site shall be closely coordinated so all work can be completed without interruption. Trailer locations, staging areas and related use of site shall be coordinated between the contractors to prevent work interruption.

C. Final connections of the gravity sewer shall be made by the work under this Contract and only after the sewer has been properly tested, commissioned and accepted by Owner.

D. Where common or mutual work is specified (i.e., common trenches, temporary electric connection, safety fence, etc.), work shall be performed under this contract. When work is separate and divisible, work to be performed by each Contractor.

E. Contactor under this contract shall be responsible for pest control, storm water control, site storm drainage and sediment and erosion control at the gravity sewer construction site work areas. Contractor for work under the separate contract shall be responsible for these tasks on their project outside the limits of the gravity sewer construction site work areas.

F. Any conflicts amongst projects shall be brought to the attention of the Owner and Owner's Representative for resolution. Decision of the Owner shall be final.

G. Extent of Contract: Unless the Agreement contains a more specific description of the work, requirements indicated on Drawings and in Specification Sections determine which contract includes a specific element of Project.

1. Unless otherwise indicated, the work described in this Section for each contract shall be complete systems and assemblies, including products, components, accessories, and installation required by the Contract Documents.

H. Temporary Facilities and Controls: In addition to specific responsibilities for temporary facilities and controls indicated in this Section and in Division 01 Section "Temporary Facilities and Controls," Contractor is responsible for the following:

1. Installation, operation, maintenance, and removal of each temporary facility necessary for its own normal construction activity, and costs and use charges associated with each facility, except as otherwise provided for in this Section.
2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
3. Its own storage and fabrication sheds.
4. Temporary enclosures for its own construction activities.
5. Staging and scaffolding for its own construction activities.
6. General hoisting facilities for its own construction activities.
7. Waste disposal facilities, including collection and legal disposal of its own hazardous, dangerous, unsanitary, or other harmful waste materials.
8. Progress cleaning of work areas affected by its operations on a daily basis.
9. Secure lockup of its own tools, materials, and equipment.
10. Noise control, erosion control, environmental protection and fire protection shall be in compliance with local laws, codes and regulations for its own construction activities.
11. Weather protection, dust protection, security, temporary heat, temporary light, temporary ventilation, temporary cooling, tree protection, safety fencing, protection of work, protection of existing structures and flood protection for its own construction activities.
12. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
13. Site sanitary sewerage for its own construction trailer.
14. Temporary roads and paved areas for its own construction activities.
15. Project identification and temporary signs for its own construction project.
16. General waste disposal facilities areas for its own construction activities.
17. Temporary stairs areas for its own construction activities.
18. Temporary fire-protection facilities areas for its own construction activities.

19. Barricades, warning signs, and lights areas for its own construction activities.
20. Security enclosure and lockup areas for its own construction activities.
21. Environmental protection areas for its own construction activities.
22. Restoration of Owner's existing facilities used as temporary facilities areas for its own construction activities.
23. Temporary wastewater conveyance systems for its own construction activities.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION 01105

SECTION 01140 - WORK RESTRICTIONS

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Low Pressure System installation, testing and commissioning.

B. Site access and control of areas outside of site.

C. Contractor use of the premises.

D. Contractor storage, parking and deliveries.

E. Work hours, employee conduct and miscellaneous employee requirements.

F. Contract requirements related to maintaining Owner's current operations and excess inspection required.

G. Minimum safety and confined space access requirements.

H. Excavating in the immediate vicinity of any underground gas facility.

I. Procedure for working near transmission mains.

1.2 GENERAL

A. Contractor shall provide for suitable and sufficient means to bypass and/or divert stormwater flow, as necessary, to conduct the required Work during construction activities. Means and methods for bypass of stormwater flows shall be submitted by the Contractor and reviewed by the Owner and Owner's Representative prior to commencement of construction activities.

B. Contractor shall provide all piping, pumps, valves and appurtenances for bypass of stormwater flow during the construction activities, as required and/or as directed by the Owner and/or Owner's Representative. Timing of shutdowns and/or bypassing (i.e., daily and seasonal) shall be reviewed by the Owner and Owner's Representative.

C. Recommended sequence of construction operations shall be discussed with the Owner and Owner's Representative at the pre-construction meeting and as appropriate throughout the Project during Progress Meetings.

D. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.

E. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner and Owner's Representative not less than two (2) days in advance of proposed utility interruptions.
2. Obtain Owner and Owner's Representative written permission before proceeding with utility interruptions.

F. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner and Owner's Representative not less than two (2) days in advance of proposed disruptive operations.
2. Obtain Owner and Owner's Representative written permission before proceeding with disruptive operations.

G. Nonsmoking Building: Smoking is not permitted within any building or within 25 feet of entrances, operable windows, or outdoor air intakes.

H. Controlled Substances: Use of tobacco products and other controlled substances inside buildings is not permitted as stated herein.

I. Employee Identification: Provide identification tags for Contractor personnel working on the Project site. Require personnel to utilize identification tags at all times to be on display on the outermost clothing at all times.

J. Compliance and certification with relevant OSHA training, confined space and trench safety courses shall be maintained and provided by all Contractor personnel and subcontractors.

K. For the purposes of this contract any reference in the contract, specifications and drawings that refers to GALVANIZED shall mean only hot dipped galvanization of any and all metals. Only hot dipped galvanized metals shall be accepted where called for galvanized metals. All other forms of galvanized metals shall be rejected and replaced immediately.

1.3 LOW PRESSUERE SEWER INSTALLATION, TESTING AND COMMISSIONING

A. Contractor shall conduct low pressure force main testing, as specified and between each Air Release Valve Manhole and Flushing Manhole. Upon successful completion and acceptance of same by the Owner, Contractor shall provide for permanent trench restoration, as specified

1.4 SITE ACCESS AND CONTROL

A. Contractor shall use an entrance designated by the Owner's Construction Representative.

1. Owner may permit, solely at the Owner's discretion, the temporary use of another entrance for site access.
2. Owner will only review requests made by the Contractor for an exception to the designated site entrance if made in writing at least 72 hours in advance of each of the times desired for use.

B. Contractor shall maintain access to each property driveway clear of materials, vehicles and any other obstacle or debris. Failure to do so will result in a minimum back charge of $750 per occurrence.

C. Owner intends to be a good neighbor to the residences and local business owners. Contractor shall not close any road for any period of time, unless otherwise directed by Owner's Construction Representative. Contractor shall take whatever measures are necessary to not cause any inconvenience to residences and businesses.

D. Contractor shall be responsible to employ methods to prevent construction materials and/or debris from leaving the site. Routinely monitor the areas surrounding the site during the day as well as at the end of the workday and immediately clean-up any area to its previous condition.

E. Employ methods to prevent the transmission of dirt from vehicles from depositing on roadways.

F. Contractor shall be responsible to immediately clean roadway, should the measures being taken by the Contractor not satisfactorily control the transmission of any dirt to the roadway.

G. Any damages to work areas, spills of soil, liquid, or any other material shall immediately be repaired, cleaned and restored to its previous condition.

H. Comply with all Federal, State and Local requirements for allowable weight limits of vehicles on all roads.

I. Owner reserves the right to back charge the Contractor for all costs associated with maintaining the grounds as well as maintaining areas outside the site, which may be disturbed by the Contractor should the Contractor fail to maintain or repair the aforementioned in a condition acceptable to the Owner.

1.5 CONTRACTOR USE OF THE PREMISES

A. Premises, for the purpose of this Contract, shall mean the site, buildings and other structures located within the property line or in any temporary or permanent construction easements identified on the plans.

B. Use and manage the premises and the associated construction activities as follows:

1. To not hinder the Owner's ability to operate their facilities.
2. To allow for stockpiling of construction material and debris without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
3. To allow for the stockpiling of excavated soil and imported fill, when called for, without any significant hardship, as defined by the Owner's Construction Representative, on the Owner or other contractors.
4. To allow utility companies to install their work.
5. To allow for the delivery of equipment and materials by independent trucking companies by leaving enough space for backing in and out of areas.
6. To allow for the safe, unimpeded travel way of the Owners vehicles, Owner's Construction Representative's vehicles, Architect's and Engineer's vehicles, construction vehicles and heavy construction equipment about the entire site.

C. Maintain the premises in a safe condition throughout the construction period. Compliance with OSHA regulations and site safety shall be the responsibility of the Contractor as it relates to work of the Contract. The posting of all applicable OSHA safety signs shall be the responsibly of the Contractor.

D. Provide temporary handrails, as required, for their work or for work put in place by their Contract that will require temporary handrails.

E. Contractor shall be responsible for protecting Owners and public property. All existing buildings, structures, shrubs, trees, lawn fixtures, sculptures and miscellaneous equipment shall be protected at all times. Any removals or relocation of said objects, if allowed shall be as directed by Owner's Construction Representative.

F. Protect all of the physical structures, property and improvements upon the site from damage by their Work and shall immediately repair or replace damage caused by construction operations, employees or equipment employed by the Contractor. All labor, materials and equipment and outside contractors that are employed by the Owner to repair damage caused by the Contractor shall be billed to the Contractor directly or withheld from money due the Contractor for work already completed.

G. Keep all existing operations areas, driveways, roads, and parking areas free and clear of materials and equipment. Do not unreasonably encumber the site with materials and equipment. Confine stockpiling of excess excavated material, materials and equipment to areas designated by the Owner's Construction Representative. Locate storage sheds and trailers to areas designated by the Owner's Construction Representative.

H. Immediately remove excess excavated material or relocate to areas on the site requiring placement of fill. Do not stockpile excess material on the site without written approval of the Owner's Construction Representative.

I. Additional compensation for relocating staging areas, equipment and material storage, and trailers are not to be considered an extra cost to the Contractor, as this is an anticipated expense that shall be considered at the time of the bid.

J. Contractor shall be responsible to clean up all materials and debris. Failure to maintain a clean work site daily will result in other's performing the work and the Contractor being back charged for the cleaning cost plus construction administration fees.

K. Do not discard or dispose of any waste on-site.

L. Open fires will not be permitted on the site.

M. Employ erosion control measures to protect properties located adjacent to the work as directed by the Owner's Construction Representative and as required by regulatory agencies.

N. Install erosion control measures as indicated in the Contract and as directed by the Owner's Construction Representative. Contractor shall confine stormwater runoff to the site.

O. Contractor shall be responsible for managing dust as specified in Section 01500.

1.6 CONTRACTOR STORAGE, PARKING AND DELIVERIES

A. Provide exterior storage containers, as required and as directed by the Owner's Construction Representative. Final location of storage container shall be determined by the Owner's Construction Representative.

B. Do not unreasonably encumber the premises with materials and equipment. Store all equipment and materials to allow the Owner's employees to operate and conduct their business safely.

C. Confine premise storage areas to locations designated by the Owner's Representative. Immediately repair or replace damaged facilities at storage areas to the satisfaction of the Owner's Representative and to a condition that existed before the damage occurred as determined by preconstruction photographs, or if photographs are unavailable, to that deemed by the Owner's Representative.

D. Storage of chemicals and paints shall follow manufacturer's guidelines.

E. Compressed gas containers shall be properly stored and secured per OSHA, to the satisfaction of the Owner's Construction Representative. Failure to do so will result in a $250 back charge, per occurrence.

F. Provide a minimum of 48 hours advance written notice to the Owner's Representative for deliveries of materials, site visits by inspectors, manufacturer's representatives or any other occasion that impacts the use of the site. Contractor shall be responsible for any costs that are incurred by the Owner, for failure to meet previously agreed upon appointments or work schedules.

G. Deliveries sent to the Owner will not be signed for or unloaded by the Owner or Owner's Representative. They will be directed to the construction site and if no employee is on site, the delivery will be rejected, at the Contractor's expense.

H. Night deliveries of equipment (past the designated quitting time) will not be permitted. Do not schedule trucking companies to deliver equipment or wait for the job site to open. Delivery trucks shall not obstruct the site entrance, shall not sit within the neighborhood causing an obstruction or perceived nuisance, nor be left idling on or off the site for any period of time.

I. Parking shall be in areas designated by the Owner's Representative. All automotive type vehicles are to be locked when parked or unattended to prevent unauthorized use. Do not leave vehicles or equipment unattended with the motor running or the ignition key in place. Any vehicles or trucks in non-designated areas may be towed at contractor's expense.

1.7 WORK HOURS, EMPLOYEE CONDUCT AND MISCELLANEOUS EMPLOYEE REQUIREMENTS

A. Contractor will be permitted to schedule working days and hours as specified in the General Conditions, unless otherwise specified herein.

B. Unless otherwise directed, roadwork within the Village of Sag Harbor shall be Monday to Friday 7:00 am to 3:30 pm. Unless otherwise directed, one 10' wide lane of traffic shall be maintained in each direction.

C. All Contractor personal shall act in a professional manner. Any person using inappropriate language or who is disruptive to the work environment will be banned from the site.

D. Proper work attire is required. Shirts are to be worn at all times and no short pants are permitted.

E. Contractor personal shall not converse with local residents or Owner's employees.

F. Any Contractor personal found under the influence of any drug or alcohol will be banned from the site.

1.8 CONTRACT REQUIREMENTS RELATED TO MAINTAINING OWNER'S CURRENT OPERATIONS AND EXCESS INSPECTION REQUIRED

A. Schedule working days and hours as specified. Pay all excess costs for inspection services provided by the Owner, Owner's Representative and/or Engineer for working beyond the times specified.

B. The hourly rate charged for inspection services beyond normal working hours shall be at standard hourly billing rates adjusted by an appropriate premium for overtime, whether time-and-one-half, double time, or otherwise, as applicable and prior to applying multipliers per inspector. The actual amount charged will be calculated in accordance with the General Conditions.

C. It is the Contractor's responsibility to determine the dollar amount to be included in the bid to pay for the services of each inspector to be present during the entire time work is being performed during low flow periods or beyond a normal 8-hour day. The maximum hourly billing rate applies for all instances where excess engineering is performed beyond a normal 8-hour workday, not just work to be performed during low flow periods.

D. Contractor will be allowed to work early morning hours if a planned tie-in must be performed. Early morning work may be required since it is a low flow period. Provide 72 hours advanced notice to the Owner's Representative for all early morning work together with a written plan as to the steps necessary to prosecute the work. The overtime salary costs for early morning tie-in work associated with having Owner operations staff present shall be paid by the Contractor.

1.9 MINIMUM SAFETY AND CONFINED SPACE ACCESS REQUIREMENTS

A. All manholes will be classified as "Confined Space" until the new sewers are connected to the existing collection system. Once connected to the existing collection system, all new manholes will be classified as "Permit Confined Space" as specified herein for permit confined space requirements.

B. The following minimum requirements are to be provided in addition at all applicable Federal, State, County and Local health and safety requirements and all OSHA requirements.

C. Fall Protection:

1. Provide fall prevention for all personnel working more than 5 feet above the next closest lower floor/grade level.
2. All personnel shall connect to a suitable fall prevention device when climbing or descending between any levels greater than 5 feet vertically via any ladder or non-staircase type access way.

D. Confined Space Areas:

1. Any space over five (5) feet in depth and not designated for continuous occupation shall be considered a Confined Space (i.e., tanks, pits, vaults, manholes, wet wells, etc.).
2. Any tank and structure being constructed becomes a confined space once all sides of the structure are formed or constructed thus leaving access via the top side only.
3. All new structures shall be considered Confined Space until they are physically connected to any other Permit Confined Space via a pipeline or passageway, at which time the space shall be classified as Permit Confined Space.
4. Confined Space Requirements:

    a. These minimum requirements shall be provided for by the Contractor when personnel are required to enter a classified Confined Space during the work.
    b. These minimum requirements are in addition to all required safety and precautionary provisions as required by all OSHA, Federal, State, County or local requirements.

        1) Check space for atmospheric hazards prior to any entry, each day and at all times during the entry.
        2) Utilize four (4) gas - Oxygen (O2), Carbon Dioxide (CO), Hydrogen Sulfide (HS) and Lower Explosive Limit (LEL) - portable monitor to test the space before and during the entry period.
        3) All entrants shall be outfitted with a full body harness with D-ring attachment and shall attach to fall protection when entering or exiting the space.
        4) Rescue winch and hoist retrieval system set up and in place at the space.
        5) Hard hat.

    c. Permit Confined Space Areas:

        1) Any space over four (4) feet in depth and not designated for continuous occupation and that contained sewage or chemicals at some time shall be considered a Permit Confined Space (i.e., tanks, pits, vaults, manholes, wet wells, etc.).
        2) Any tank or structure being constructed becomes a Permit Confined Space once all sides of the structure are formed or constructed thus leaving access via the top side only and the top side has a deck or limited entry/exit access point less than 50% of the total floor area.
        3) All new structures shall be as a Permit Confined Space when they are physically connected to any other Permit Confined Space via a pipeline or passageway.

4) All existing structures that contained sewage or chemicals at some time shall be considered Permit Confined Space until such time as they are permanently disconnected from any other Permit Confined Space and the interior of the structures is suitably cleaned of all containments, at which time they shall be considered as a Confined Space.

1.10 EXCAVATING IN THE IMMEDIATE VICINITY OF ANY UNDERGROUND GAS FACILITY

A. Description:

1. The intent of this procedure is to establish guidelines for gas utility personnel and gas utility contractor crews excavating in the immediate vicinity of any underground gas facility.
2. Additional procedures for planned excavation in the vicinity of gas transmission lines are to be followed as specified herein.

B. Procedure

1. The following procedure is to be followed by all employees of the company and its contractors when it becomes necessary, either planned or unplanned, to excavate in the immediate vicinity of any underground gas facility:

a. Prior to any excavation in the vicinity of any suspected underground gas facility, the person in direct charge of the field operation shall take the following precautions:

1) Visually inspect the immediate vicinity for paved or backfilled cuts or trenches that may indicate the location of underground gas facilities.
2) Visually inspect the immediate vicinity for valve, drip or anode boxes, and for any other gas-related appurtenances such as vent poles, pipeline markers or gas manhole covers.
3) Obtain the appropriate intersection drawings and any related fields sketches, if available, and review for the presence of gas transmission mains, regulator stations or gate stations in the vicinity of the proposed excavation. If such installations are indicated then notification shall be made to the GSO system control center. These installations will have detailed as-built drawings. A copy of the specific drawing for the site should be reviewed to determine piping configuration, control lines and all other appurtenances in the vicinity of excavation. The construction inspection group shall be requested to perform a mark-out of all gas lines and structures in the vicinity of proposed excavation. Conductive pipe locating equipment should be utilized by trained and qualified personnel to locate lines and hand excavation shall be used to expose all underground gas structures in the affected area before proceeding with powered excavation, if powered excavation is necessary.
4) The drawings/field sketches shall be reviewed for locations of H.P. and L.P. drips in the vicinity of the excavation. Pump all drips that will have standpipes physically within the proposed excavation limits.

Note: drips may only be pumped by qualified personnel, see environmental

procedures for the handling and transportation of drip liquids. H.P. drips require specialized equipment and require "central operations support" personnel to pump them. If a drip is found to contain liquid, all liquids must be removed prior to the start of the construction. As necessary, the pumped drip should be rechecked again for liquids just prior to the immediate start of construction in that vicinity. If a standpipe shown on a drawing cannot be located after a thorough investigation, hand excavation must be used in the indicated area to avoid potential damage to the hidden standpipe and to avert the release of liquids.

5) Review the gas service records. Obtain available sketches for large diameter or high- pressure service installations. Wherever possible, gain entrance to building to verity point of entry of gas service (as well as water, sewer, electric and telephone) as well as to connect m-scope equipment directly to service where necessary. Look for curb valve boxes, high-pressure vents and outside meter sets to indicate service locations.

6) Where indicated on plans refer to detailed construction drawings, appropriate drawings and available field sketches. If actual locations or incorrect field records are discovered upon excavation, then appropriate data corrections shall be submitted (i.e., service correction forms, corrected field sketches, etc.).

2. The "tolerance zone" is defined as 5 feet plus ½ the gas pipe diameter distance away from the locator's mark outline of the gas facility (i.e., Facility centerline) in either direction from the line.
3. Test holes shall be excavated to expose the physical location and verity underground gas facilities as directed by the National Grid representative for any work performed by owning utility crews or owning utility contractor crews.
4. Except for surface pavement breaking, test holes or any other excavation shall be excavated by hand within the gas facility's "tolerance zone". Upon locating and verify the gas facility, powered excavation (i.e., backhoes, dig-its, augurs, etc.) shall be used only outside the zone of protection for the gas line. The zone of protection shall be defined as 4 inches from any face of a distribution gas facility and 24 inches from any face of a gas transmission line.
5. Exposed gas facilities shall be supported as necessary during excavation activities to prevent failure. Undermine or 1:1 slope conditions with respect to cast iron mains should be prevented, if possible.
6. Additional procedures for planned excavation in the vicinity of gas transmission lines are to be followed as specified herein.

1.11 PROCEDURE FOR WORKING NEAR TRANSMISSION MAINS

A. Description:

1. This procedure provides the guidelines for any work near transmission pipe by third party contractors, National Grid in house contractors or National Grid crews. For this procedure transmission pipe is any main or service operating at or above 125 psig.

B. Procedure:

1. Definitions

    a. Near Zone - defined as the area within 15 feet of a proposed excavation.
    b. Tolerance Zone - defined as 5 feet plus ½ the gas pipe diameter distance away from the locator's mark outline of the gas facility (i.e., facility centerline) in either direction from the line.
    c. In-house Contractor – National Grid contractor performing gas work for the owning utility. Third Party Contractor- outside contractor performing non-gas work for outside municipality.
    d. National Grid Lead Person – National Grid employee responsible for overseeing the prescribed work.
    e. National Grid Representative – National Grid Lead Person, or the agreed to in-house contractor lead person in charge of the worksite in the absence of the National Grid Lead Person.

2. General

    a. Whenever a transmission main or service falls within the Near Zone and is to be exposed or is found exposed or has evidence of a recent excavation;

        1) Notify Central Dispatch; LI: (516) 545-4047

    b. If any contractor is excavating near a transmission main and there is no National Grid Lead Person present:

        1) Inform the contractor that a gas transmission main is in the vicinity and if appropriate, ask that the contractor stop work.
        2) Call Central Dispatch
        3) Stand by the excavation until a National Grid representative arrives.

    c. Central Dispatch must notify the appropriate Corrosion area, the Lead Gas Controller and the Section Managers of Gas Systems Operations, Damage Prevention, Field Operations and Construction.
    d. When work is to be performed by the National Grid, a Rule 753 notification must be filed if powered excavation is planned.
    e. In Long Island: Markout contractor notifies the appropriate Operations Area of Transmission main involvement. Markout contractor completes markout.

C. On site Coordination:

1. A National Grid Lead Person must be onsite continuously during any excavation work in the Near Zone.
2. The National Grid Lead Person/Supervisor shall conduct a walk through at site with the KED in-house contractor or outside third party contractor lead person prior to the initiation of work.
3. The National Grid Lead Person shall conduct daily job briefings with the onsite in-house contractor or third party contractor crew lead person.
4. In the NEAR ZONE, test holes must be excavated to sufficiently locate and verify the transmission pipe with respect to the proposed work and in advance of the proposed excavation. Test holes shall be excavated as directed by the National Grid Lead Person

for work by third party contractors, National Grid crews or National Grid in house contractors. If there is any difficulty in locating the pipe, request assistance from Central Dispatch.

There may be instances where the National Grid Lead Person may determine to not require a test hole or deviate from test opening requirements due to his knowledge and experience with the location of the facilities in reference to the proposed excavation. The Lead Person shall require approval from his Supervisor, Project Engineer or the Field Operations Manager when making this determination and document the results by region on the LI Transmission Inspection Form or the NYC Transmission Pipe Protection Review (PRR) Form as appropriate.

5. Except for surface pavement breaking, soil excavation for purposes of test holes or excavation of the gas pipe SHALL be made by HAND EXCAVATION within the transmission pipe's "TOLERANCE ZONE". Upon verification of the gas facility, powered excavation (i.e., backhoes, dig-its, augurs, etc.) shall be used only “outside” the tolerance zone of protection for the gas line.

   Note: As per PSC Code 753-3.6 Verification of underground facilities,” Powered or mechanized equipment may be used within the tolerance zone for removal of pavement or masonry but only to the depth of such pavement or masonry."

6. Within the NEAR ZONE, whenever there is a change in cover or lateral direction of the transmission pipe, the PIPE DIRECTION CHANGE MUST BE LOCATED, and done so by HAND EXCAVATION. This is to prevent possible damage to the transmission pipe in case the pipe direction changes are not accurately represented on company records.
7. Within the NEAR ZONE, test holes shall always be excavated at points along the transmission pipe where the transmission gas pipe will be crossed at any angle by a proposed trench or excavation.
8. Within the NEAR ZONE, test holes shall be excavated at a minimum of 50 feet intervals over transmission pipe that runs adjacent to a proposed construction trench. Test holes shall also be excavated over transmission pipe that runs adjacent to a proposed individual construction excavation(s).
9. If the transmission main is located in an extraordinary location with respect to the scope of the proposed construction (i.e., proposed utility poles inside sidewalk curb line and transmission main located in NEAR ZONE within an active paved town highway or NYS roadway), test openings may be made at distances greater than 50 feet intervals apart or deemed not required within the confines of the extraordinary location. THIS SHALL BE DECIDED UPON, HOWEVER, ONLY WITH PERMISSION AND AT THE DISCRETION OF AN EXPERIENCED NATIONAL GRID LEAD PERSON/SUPERVISOR USING SOUND JUDGEMENT.

   SOUND JUDGEMENT shall be based on, but not limited to, an ACCOUNTABLE DEGREE OF ACCURACY of a SAFE DISTANCE between the location of National Grid's facility and the proposed work, the scope of the proposed work, any additional given conditions at the time, and the procedures herein. Any reason NOT TO TEST WHOLE OR DEVIATE FROM TEST OPENING REQUIREMENTS herein for a particular location MUST BE NOTED AS SUCH on the LI-Transmission Main Inspection Form.

10. Existing gas valve boxes can be used to determine the point location of a transmission line providing the valve is verified as an active transmission main valve, its current location verified correct with existing Graphic Records information and the valve stem visible.
11. Visually inspected anode boxes, and other gas-related appurtenances such as pipeline markers can be utilized as a guide to indicate the general location of underground gas facilities.
12. All relevant updated company and third party drawings should be on site and reviewed.
13. Any inaccuracies are to be noted and forwarded to Graphic Records for immediate updating.
14. Once located, review and correct all previous mark outs.
15. The Transmission pipe shall be protected as required by Standard Drawings CNST-6040 or CNST-6050. A decision not to the pipe must be approved by the Project Engineer or the Field Operations Manager. The decision shall be documented and approved as such on the appropriate regional forms:

    LI - Transmission Main Inspection Form, or the

D. Forms - must be completed and on-site at all times:

    LI - Transmission Main Inspection Form

E. Corrosion Inspection:

1. Whenever the transmission main is exposed or damage to the coating or pipe is suspected, a Corrosion representative will inspect the pipe and follow through with recommendations and reporting in accordance with 040036-TI, Inspecting Exposed Steel for corrosion.
2. Any metal damage to the pipe may be repaired after consultation and approval from Gas Engineering and in accordance with EMER-5010, Repair of Transmission Mains. F. Filing Requirements: LI: File ALL completed Forms and information for the useful life of the main.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01140

NO TEXT THIS PAGE

SECTION 01210 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements governing allowances.

B. Types of allowance include the following:

1. Allowance shall be included in the Contractor's Total Bid. Any allowance amounts not used during the Project shall be deducted from the final payment at project completion by a credit Change Order.

2. Owner and Owner's Representative shall determine which items qualify to be paid for as allowance items and which items are to be included in other Bid items as non-allowance work.

1.3 SUBMITTALS

A. Submit proposals and backup for purchase of products or systems included in allowance.

B. Submit invoices or delivery slips to show actual quantities of materials delivered to the site for use in fulfillment of the allowance as necessary.

C. Submit time sheets and other documentation to show labor time and cost for installation of allowance items that include installation as part of the allowance should lump sum not be agreed to.

D. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

1.4 COORDINATION

A. Coordinate allowance with other portions of the Work. Furnish templates as required to coordinate installation.

1.5 ALLOWANCES

A. Contractor shall use the allowance only as directed in writing by Owner's Representative for

Owner's purposes and only by Change Orders that indicate amounts to be charged to the allowance.

B. Contractor's overhead, profit, and related costs for products and equipment ordered by Owner under the allowance are included in the allowance and are not part of the Contract Sum. These costs include delivery, installation, insurance, equipment rental, and all other costs associated with providing a completely integrated and functioning system.

C. At Project closeout, credit unused amounts remaining in the allowance to Owner by Change Order.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALLOWANCES

A. Unforeseen Construction Allowance – An allowance for one hundred thousand dollars ($100,000) for unforeseen construction on the Project, as necessary to perform the work and as authorized by the Owner and/or Owner's Representative. Unforeseen construction shall also be as specified in the General Conditions. Overhead and profit shall be included as specified in the General Conditions.

END OF SECTION 01210

SECTION 01250 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

B. Related Sections:

1. Divisions 02 through 15 Sections for specific requirements and limitations for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those specified by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

B. Equivalent Materials and Equipment

1. Whenever materials or equipment are specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular manufacturer, the naming of the item is intended to establish the type, function and quality required. If the name is followed by words "or equal", materials or equipment of other suppliers may be accepted by Owner's Representative if sufficient information is submitted by Contractor to allow Owner's Representative to determine that the material or equipment proposed is equivalent or equal to that named. Requests for review of substitute items of material and equipment will not be accepted by Owner's Representative from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall make written application to Owner's Representative for acceptance thereof. The application shall state that the evaluation and acceptance of the proposed substitute will not prejudice Contractor's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified shall be identified in the application and available

maintenance, repair and replacement service shall be indicated. The application shall also contain an itemized estimate of all costs that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which shall be considered by Owner's Representative in evaluating the proposed substitute. Owner's Representative may require Contractor to furnish at Contractor's expense additional data about the proposed substitute.

2. Whenever a material or article is specified or described without the phrase "or equal," the phrase "or equal" shall be deemed included.

1.4 SUBMITTALS

A. Substitution Requests: Submit three (3) copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Contractor shall submit his request for substitutions and any monetary changes associated therewith to the Owner. Contractor's submittal shall include all necessary data for Owner's Representative evaluation. The following listing summarizes the data required:

    a. Complete date substantiating compliance of proposed substitution with Contract Documents. Substitution shall not change design intent.
    b. For Products:

        1) Product identification, including manufacturer's name and address.
        2) Manufacturer's literature including, but not necessarily limited to, product description, performance and test date and reference data.
        3) Samples where appropriate.
        4) Name and address of similar projects on which product was used, and date of installation.

2. Itemized comparison of proposed substitution with product or method specified. Different types of products and methods will be considered provided final performance is at least equal to that specified.
3. Data relating to impact on construction schedule occasioned by the proposed substitution.
4. Relation/impact to other contracts.
5. Accurate cost data on proposed substitution in comparison with product or method specified, including costs of all redesigns required.
6. In making request for substitution, the Contractor represents:

    a. He has personally investigated proposed product or method, and determined that it is equal or superior in all respects to that specified. He will provide the same guarantee for substitution as for product or method specified.
    b. He will coordinate installation of accepted substitution into work, making such design and construction changes as may be required for work to be completed in all respect.

7. Substitutions will not be considered at any time if:

    a. They are indicated or implied on shop drawings or project data submittals without formal request submitted in accordance with this section.
    b. Acceptance will require substantial revision of Contract Documents.
    c. Acceptance will create problems in stocking of repair parts and in future maintenance by the Owner.

8. Owner's Representative decision regarding evaluation of substitutions shall be considered final and binding. Request for time extension and additional costs based on submission of, acceptance of, or rejection of substitutions will not be allowed.
9. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
10. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution. Provide coordination drawings and coordination details, as requested by Owner's Representative.
11. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable specification section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
12. Certificates and qualification data, where applicable or requested.
13. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
14. Research reports evidencing compliance with building code in effect for Project.
15. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
16. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
17. Licensed Professional Engineer seal and signature on submittal as determined necessary by Owner's Representative.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage qualified testing agency to perform compatibility tests recommended by manufacturers. All data on proposed substitution must substantiate compliance with the Contract Documents. Include product identification and description, performance and test data, references and samples where applicable, and other information required by the Owner's Representative.

1.6 PROCEDURES

A. Coordination: Modify or adjust affected work as necessary to integrate work of the approved substitutions at no additional cost to Owner.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately upon discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.

1. Conditions: Owner’s Representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner’s Representative will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Substitutions intended as equivalent or alternate that do not conform to the specifications without exception and/or do not meet the pre-approval deadline will be rejected. Only written requests will be considered. Substitutions will not be considered if indicated or implied on shop drawing submissions without the required written request. Substitutions will not be considered if they require substantial revision of the Contract Documents to accommodate their use.

1. Conditions: Owner’s Representative will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Owner’s Representative will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Owner’s Representative for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.

f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.
j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01250

NO TEXT THIS PAGE

SECTION 01270 – CONSTRUCTION SURVEYS, LAYOUT AND LEVELS

PART 1 - GENERAL

1.1 CONSTRUCTION SURVEY BY THE CONTRACTOR

A. Contractor shall establish baselines for locating the principal component parts of the Work and provide all surveys and stake-outs of working or construction lines or grades as needed to establish baselines and bench marks; to provide quantity surveys, measurements, and computations, to provide original and final surveys for final quantity determination, for the setting of forms, string lines, grade control and other controls which may be required for the proper execution of the work in the Contract.

B. Contractor shall preserve and maintain in proper position all hubs, stakes, grade stakes and lines until authorized to remove same. If Contractor fails to protect the aforementioned items, he shall reset all disturbed items at his own expense. If in the opinion of the Owner's Representative the replacement of any disturbed stake necessitates the use of a Owner's Representative survey party, arrangements for such resetting will be made by the Owner's Representative and the costs therefore will be deducted from monies owed the Contractor.

C. Any work done without lines and grades or without instruction having been given by the Owner's Representative will not be estimated or paid for. Any work done may be ordered removed and replaced at no cost to the Owner and/or Owner's Representative.

D. Contractor shall furnish, at his own expense, all stakes, templates and such temporary structures as may be necessary for marking and maintaining points and lines for the work.

E. Contractor shall, unless otherwise directed by the Owner's Representative, utilize a Laser-Transit control for the installation of all piping. The laser beam shall be used coaxially through the center of the pipe being laid. The laser beam projector is to be rigidly mounted to its support platforms, with a two-point suspension or equivalent, assuming that all ground and equipment vibrations be kept to an absolute minimum. Any other equipment necessary to control atmospheric conditions in the pipe to keep line and grade to acceptable standards of accuracy shall be furnished by the Contractor.

F. Construction survey personnel shall be New York State licensed and registered land surveyors or New York State licensed and registered engineers. Contractor shall provide a list outlining the minimum requirements expected.

G. Contractor shall keep a transit and leveling instrument on the site at all times. Construction survey personnel shall be licensed and registered land surveyors or licensed and registered engineers. Contractor shall provide a list outlining the minimum requirements expected. Survey personnel (skilled survey party) shall be employed or obtained whenever necessary for layout and checking of work in progress. The survey party shall check the initial setting of the laser equipment and shall check all pertinent elevations immediately after their installation. The survey party shall conduct all surveys necessary for the recording of all information necessary for the preparation of Record Plans (As-Built Drawings). Copies of all survey notes shall be transmitted to the Owner's Representative on a weekly basis.

PART 2 - MATERIALS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01270

SECTION 01290 – SCHEDULE OF VALUES AND PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

B. Related Sections:

1. Division 01 Section "Allowances" for procedural requirements governing the handling and processing of allowances.
2. Division 01 Section "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
3. Division 01 Section "Shop Drawing Procedures" for administrative requirements governing the preparation and submittal of the submittal schedule.

1.3 DEFINITIONS

A. Schedule of Values: A statement furnished by Contractor allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing Contractor's Applications for Payment.

1.4 SCHEDULE OF VALUES

A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:

a. Application for Payment forms with continuation sheets.
b. Submittal schedule.
c. Items required to be indicated as separate activities in Contractor's construction schedule.

2. Submit the schedule of values to Owner’s Representative no later than five (5) business days from date on Notice to Proceed.

B. Format and Content: Establish line items for the schedule of values in accordance with unit prices and lump sum prices from bid sheet.

1. Identification: Include the following Project identification on the schedule of values:

a. Project name and location.
b. Name of Owner’s Representative.
c. Owner’s Representative's project number.
d. Contractor's name and address.
e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.

   a. Related Specification Section or Division.
   b. Description of the Work.
   c. Name of subcontractor.
   d. Name of manufacturer or fabricator.
   e. Name of supplier.
   f. Change Orders (numbers) that affect value.
   g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.

      1) Labor.
      2) Materials.
      3) Equipment.

3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Allowances: Provide a separate line item in the schedule of values for each allowance.

8. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.

   a. Temporary facilities that are not direct cost of actual work-in-place shall be shown as separate line items in the schedule of values.

9. Schedule Updating: Update and resubmit the schedule of values before each Application for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

10. Where a line item is provided for bond, insurance, mobilization or other similar Project setup task, as determined by Owner’s Representative, the costs for these setup items shall be equally prorated and paid over the first twelve (12) months of the project.

11. Provide a separate line item for approval of as-built drawings. Amount for as-built line item shall be approved by Owner’s Representative.

1.5 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as certified by Owner's Representative and paid for by Owner.

1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction work covered by each Application for Payment is the period indicated in the Agreement.

C. Payment Application Times: Progress payments shall be submitted to Owner's Representative. The period covered by each Application for Payment is one month, ending on the last day of the month.

1. Submit draft copy (pencil copy) of Application for Payment for review by Owner's Representative.

D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.

E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Owner's Representative will return incomplete applications without action.

1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
3. Include amounts of Change Orders issued before last day of construction period covered by application.
4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.

F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.

1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
3. Provide summary documentation for stored materials indicating the following:

a. Materials previously stored and included in previous Applications for Payment.
b. Work completed for this Application utilizing previously stored materials.
c. Additional materials stored with this Application.
d. Total materials remaining stored, including materials with this Application.

G. Transmittal: Submit six (6) signed and notarized original copies of each Application for Payment to Owner's Representative. One copy shall include waivers of lien and similar attachments if required.

1. Transmit copies with a transmittal form listing attachments and recording appropriate information about application.

H. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:

1. List of subcontractors.
2. Schedule of values.
3. Contractor's construction schedule (preliminary if not final).
4. Products list (preliminary if not final).
5. Submittal schedule (preliminary if not final).
6. Initial progress report.
7. Report of preconstruction conference.

I. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.

1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner use of designated portions of the Work.

J. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:

1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
6. AIA Document G707, "Consent of Surety to Final Payment."
7. Evidence that claims have been settled.
8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01290

SECTION 01300 – SHOP DRAWING PROCEDURES

PART 1 - GENERAL

1.1 DESCRIPTION OF WORK

A. Whenever possible throughout the Contract Documents, the minimum acceptable quality of workmanship and materials has been defined either by manufacturer's name and catalog number or by reference to recognized industry standards.

B. Contractor shall to Owner's Representative for review and approval with such promptness as to cause no delay in Work, all Shop Drawings and samples required by the Contract Documents.

C. All submissions shall be identified as Owner's Representative may require.

1.2 RELATED SECTION

A. Section 01250 – Substitution Procedures.

B. Section 01290 – Schedule of Values and Payment Procedures.

C. Section 01321 – Construction Progress Documentation.

1.3 SUBMITTAL PROCEDURES

A. Transmit each submittal with Owner's Representative accepted form (sample provided at end of section).

B. Identify Project, Contractor, Subcontractor or supplier, pertinent drawing and detail number, and specification section number, as appropriate.

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

D. Schedule submittals to expedite the Project and deliver to Owner's Representative. Coordinate submission of related items.

E. For each required submittal for review, allow fourteen (14) business days, excluding delivery time to and from the Contractor, for Owner's Representative review in accordance with these specifications.

F. Identify variations from Contract Documents and Product or system limitations.

G. Provide space for Owner's Representative and Contractor's review stamp.

H. Revise and resubmit as required. Identify all changes made since previous submission.

I. Distribute copies of reviewed submittals as specified herein. Instruct parties to promptly report any inability to comply with provisions.

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

1.4 MAINTENANCE OF PLANT OPERATIONS (MOPO)

A. Owner and Owner's Representative shall determine and notify Contractor whether planned activities that could affect Owner's operations will require MOPO Plan(s). MOPO Plans shall minimize disruption of normal sewer flows and sewer service. Contractor shall provide all piping, valves and appurtenances for bypass of sewage flow during the construction activities. Bypassing may be required to perform the necessary construction activities. Timing of shutdowns shall be approved by the Owner and Owner's Representative. Contractor shall submit Maintenance of Plant Operations Plans prior to bypassing flows.

B. Submittal and review of any requested MOPO Plan shall be included in the price of the Contract and shall be submitted until approved by Owner and Owner's Representative. Compliance and enacting all approved MOPO Plan(s) shall be at no additional cost to the Owner.

1.5 CONSTRUCTION PROGRESS SCHEDULES

A. Submit initial schedules within five (5) business days after date stated in Notice to Proceed.

B. Revise and resubmit as required.

C. Submit all revised schedules with each Application for Payment, identifying changes since previous version.

D. Submit computer generated horizontal bar chart with separate line for each section of work, identifying first workday of each week.

E. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration.

F. Indicate estimated percentage of completion for each item of Work at each submission.

G. Indicate submittal dates required for shop drawings, product data, samples, and product delivery dates, including those furnished by Owner.

1.6 SCHEDULE OF VALUES

A. Within five (5) calendar days from the date shown on the Notice to Proceed, submit a Schedule of Values to the Owner and Owner's Representative for review and approval, showing a breakdown of all construction activities for the Project. The Schedule of Values shall be detailed to indicate separate costs for all work of the Project.

B. When a line item is provided for bonds, insurance, mobilization, demobilization, supervision, construction progress schedule, field offices, traffic maintenance and protection, sediment and erosion control or other similar project tasks, as determined by the Owner's Representative, the costs shall be equally prorated and paid monthly over the duration of the Contract.

1.7 SUBCONTRACTOR LIST

A. Within ten (10) calendar days from the date shown on the Notice of Award, submit a Subcontractor

List to the Owner and/or Owner's Representative for review and approval. Include a minimum of three (3) references per subcontractor, listing contact name and telephone number. Contractor shall provide one (1) hard copy of all final shop drawings to Owner's Representative Field Office within three (3) days of receipt of approval of final electronic shop drawing submittal.

B. Contractor shall provide one (1) hard copy of all final shop drawings to Owner's Representative Office within three (3) days of receipt of approval of final electronic shop drawing submittal.

1.8 PROPOSED PRODUCTS LIST

A. Within five (5) business days after Notice to Proceed, submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product. Identify deviation(s) or change(s) or product(s) that will be proposed for substitution from specified products.

B. For products specified only by reference standards, give manufacturer, trade name, model or catalog designation, and reference standards.

1.9 SHOP DRAWINGS - GENERAL

A. Number shop drawing submittals consecutively and show:

1. All working and erection dimensions (all measurements shall be field verified).
2. Arrangement and sectional views.
3. Necessary details, including information for making connections to other work.
4. Kinds of materials and finishes.
5. Reference to Contract Drawings and Specifications. Quote drawing number(s) and exact specification section and paragraph.
6. Clearly indicate all deviations from Contract Documents.

B. Shop Drawings shall be dated and shall contain:

1. Name and Contact Number of Project.
2. Description of required equipment, materials and classified item numbers.
3. Locations at which materials or equipment are to be installed in the work.

C. Submit shop drawings with a letter of transmittal and shop drawing submittal form (refer to sample at end of section) and containing the name of the Project, Owner's Project Number, Owner's Representative Project Number, Contractor's name, number of drawings, titles and other pertinent data, as requested by the Owner's Representative.

D. Shop Drawing Stamp shall indicate:

1. "No Exceptions Taken"
2. "Make Corrections Noted"
3. "Amend and Resubmit"
4. "Rejected – See Remarks"

E. Shop drawings must be resubmitted until stamped "No Exceptions Taken" or "Make Corrections Noted". The submittal will be reviewed only for general conformance with the design concept and for general compliance with the Contract Documents. The review does not relieve the Contractor from any responsibility for all of the requirements of the Contract Documents, including, but not limited to: job conditions, clearances, physical dimensions, coordination and construction techniques and processes; nor permit any deviation from drawings and specifications-any such deviation requires a specific written order.

F. Drawings shall be produced in the same AutoCAD program, version, and operating system as the original Contract Drawings. Electronic data, where applicable, shall be submitted on CD.

G. Subcontractor's drawings shall be checked and stamped by the Prime Contractor before submission to the Owner's Representative.

H. For drawings returned "Amend and Resubmit' or "Rejected – See Remarks", correct the original drawings, submit corrected reprints, and resubmit until final "No Exceptions Taken" or "Make Corrections Noted" is obtained.

I. If shop drawing item is rejected, Owner will receive a copy of the transmittal returning shop drawings to Contractor.

J. For drawings returned "No Exceptions Taken" and "Make Corrections Noted" the Contractor shall obtain and issue sufficient prints as specified herein.

K. Do not work as called for by shop drawings until Owner's Representative review has been completed. Contractor may proceed with fabrication if shop drawing is stamped "No Exceptions Taken" or "Make Corrections Noted".

L. If shop drawings show variations from Contract requirements because of standard shop practice, or other reasons, Contractor shall make specific mention of such variation in his letter of transmittal.

M. Owner's Representative will review with reasonable promptness Shop Drawings and samples, but Owner's Representative's review will be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents and shall not extend to means, methods, techniques, sequences of procedures of construction (except where a specific means, method, technique, sequence or procedure of construction is indicated in or required by the Contract Documents) or to safety precautions or programs incident thereto. The review of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make corrections required by Owner's Representative and shall return the required number of corrected copies of Shop Drawings and submit as required new samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Owner's Representative on previous submittals.

N. Approval of shop drawings is general. It does not relieve the Contractor of the responsibility for accuracy of such drawings, nor for the furnishing of materials or work required by the Contract and not shown on the shop drawings.

O. Changes shall not be permitted on Shop Drawings that have been previously submitted for approval, except for items that have been noted for corrections or coordination.

P. If the Contractor should alter any information on previously submitted shop drawings besides the notation called for by the Owner's Representative, he must circle this new information to bring it to the attention of the Owner's Representative.

Q. Where a Shop Drawing or sample is required by the Specifications, any related Work performed prior to Owner's Representative's review and approval of the pertinent submission will be the sole expense and responsibility of Contractor.

R. In submitting shop drawings for review, submit all associated drawings relating to a complete

assembly at one time so that each may be checked in relation to the entire proposed assembly.

S. Have copies of all "No Exceptions Taken" and "Make Corrections Noted" shop drawings on the job at all times and make them available to the Owner's Representative.

T. Contractor shall refer to the relevant specification sections where shop drawings, product data and samples are required to be submitted.

1.10 ELECTRONIC SUBMITTAL PROCEDURES

A. Summary:

1. Shop drawing and product data submittals shall be transmitted to Owner's Representative in electronic (PDF) format.
2. The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time.
3. The electronic submittal process is not intended for color samples, color charts, or physical material samples.

B. Procedures:

1. Submittal Preparation - Contractor may use any or all of the following options:

    a. Subcontractors and Suppliers provide electronic (PDF) submittals to Contractor.
    b. Subcontractors and Suppliers provide paper submittals to General Contractor who electronically scans and converts to PDF format.
    c. Subcontractors and Suppliers provide paper submittals to Scanning Service which electronically scans and converts to PDF format.

2. Contractor shall review and apply electronic stamp certifying that the submittal complies with the requirements of the Contract Documents including verification of manufacturer/product, dimensions and coordination of information with other parts of the work.
3. Contractor shall transmit each submittal to Owner's Representative via electronic (PDF) format.
4. Owner's Representative review comments will be provided on the electronic (PDF) format shop drawing submittal. Contractor will receive email of the completed review.
5. Distribution of reviewed submittals to subcontractors and suppliers is the responsibility of the Contractor.
6. Submit paper copies of reviewed submittals at project closeout for record purposes in accordance with Section 01710 - Record Drawings and Closeout Procedures.

C. Costs:

1. Contractor shall include the full cost of Internet Service and Equipment Requirements:

    a. Email address and Internet access at Contractor's main office.
    b. Adobe Acrobat (www.adobe.com), Bluebeam PDF Revu (www.bluebeam.com), or other similar PDF review software for applying electronic stamps and comments.

1.11 HARD COPY SUBMITTAL PROCEDURES

A. Contractor shall provide one (1) hard copy of all final shop drawings to Owner and Owner's

Representative within three (3) days of receipt of approval of final electronic shop drawing submittal.

1.12 MANUFACTURER INSTALLATION INSTRUCTIONS

A. When specified in individual specification sections, submit printed instructions for delivery, pre-installation maintenance, maintenance during storage, assembly, installation, start-up, adjusting, and finishing, to Owner's Representative in quantities specified for Product Data.

B. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.

1.13 MANUFACTURER CERTIFICATES

A. When specified in individual specification sections, submit copies of certification by manufacturer to Owner's Representative.

B. Indicate material or Product conforms to or exceeds specified requirements. Submit supporting reference data, affidavits, and certifications as appropriate.

C. Certificates may be recent or previous test results on material or Product but must be acceptable to Owner's Representative.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01300

SECTION 01310 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General project coordination procedures.
2. Administrative and supervisory personnel.
3. Coordination drawings.
4. Requests for Information (RFI's).
5. Project meetings.

B. Each contractor shall participate in coordination requirements. Certain areas of responsibility are assigned to a specific contractor.

C. Related Sections:

1. Division 01 Section "Summary" for coordination of subcontractors and overall Project coordination.
2. Division 01 Section "Shop Drawing Procedures" for preparing and submitting various Shop Drawings.
3. Division 01 Section "Construction Progress Documentation" for preparing and submitting Project look ahead and schedules.
4. Division 01 Section "Record Drawings and Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

A. RFI: Request from Owner, Owner's Representative, or Contractor seeking information from each other during construction.

1.4 COORDINATION

A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in sequence required to obtain the best results where

installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.
4. Provide for overall Project coordination.

B. Coordinate all work with Suffolk County Transit, local school district busing companies and local homeowner and civic associations, as required.

1.5 KEY PERSONNEL

A. Key Personnel Names: Within five (5) business days of starting construction operations, submit a list of key personnel assignments, including superintendent, two (2) project managers and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities, including who will respond to any emergency, at anytime on a 24/7 basis throughout the duration of the Project; list addresses and telephone numbers, including home, office, cellular and pager telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room(s), in temporary field office(s), and by each temporary telephone. Keep list current at all times.

1.6 PROJECT SUPERINTENDENCE/SUPERVISORS

A. Project Superintendent and his Supervisor(s) shall be required to be on-site whenever work is being performed by the Contractor and/or his subcontractor(s). Project Superintendent shall not be permitted to conduct day to day “hands on” work unless temporarily instructing personnel on means and methods of construction. Supervisor shall be the on-site representative and shall communicate with the Owner’s Representative and Owner on a daily basis.

1.7 REQUESTS FOR INFORMATION (RFI’s)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Owner’s Representative will return RFI’s submitted to Owner’s Representative by other entities controlled by Contractor with no response.
2. Coordinate and submit RFI’s in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
2. Project number.
3. Date.
4. Name of Contractor.

5. Name of Owner’s Representative.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: Software-generated form with substantially the same content as indicated above and acceptable to Owner’s Representative.

D. Owner and/or Owner’s Representative's Action: Owner and/or Owner’s Representative will review each RFI, determine action required, and respond. Allow ten (10) business days for Owner and/or Owner’s Representative's response for each RFI. RFI’s received by Owner and/or Owner’s Representative after 1:00 p.m. will be considered as received the following working day.

1. The following RFI’s will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for coordination information already indicated in the Contract Documents.
    d. Requests for adjustments in the Contract Time or the Contract Sum.
    e. Requests for interpretation of Owner’s Representative's actions on submittals.
    f. Incomplete RFI’s or inaccurately prepared RFI’s.

2. Owner and/or Owner’s Representative's action may include a request for additional information, in which case Owner and/or Owner’s Representative's time for response will date from time of receipt of additional information.
3. Owner and/or Owner’s Representative's action on RFI’s that may result in a change to the Contract Time or the Contract Sum may require Contractor to submit Change Order Proposal.

    a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Owner and/or Owner’s Representative in writing within ten (10) business days of receipt of the RFI response.

E. On receipt of Owner’s Representative's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Owner’s Representative within ten (10) business days if Contractor disagrees with response.

F. RFI Log: Prepare, maintain, and submit a tabular log of RFI's organized by the RFI number. Submit log monthly. Include the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Owner's Representative.
4. RFI number including RFI's that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Owner's Representative's response was received.
8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
9. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

1.8 PROJECT MEETINGS

A. General: Owner's Representative will schedule and conduct meetings and conferences at Project site at a time convenient to Owner and/or Owner's Representative, unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Contractors' Site Superintendent shall be required to attend all meetings scheduled by the Owner's Representative and shall be a competent supervisor familiar with the Work and have authority to act for the Contractor. If Contractors' Site Superintendent fails to attend any scheduled meetings without prior approval, Contractor shall be directed to replace the current Contractors' Site Superintendent. Non-attendance by the Contractors' Site Superintendent will form the basis for review of the Contractor's responsible bidder status.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Owner's Representative will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned within five (5) business days of the meeting.
4. Contractor shall supply an itemized summary of work completed since the previous meeting and an itemized list of work projected for the next Project meeting. The lists shall be reviewed at each meeting for status and compliance with projections. Deviations in the Project schedule shall be monitored, in part, through the review and compliance with the projected work schedules.

B. Preconstruction Conference: Owner's Representative will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and/or Owner's Representative, but no later than fifteen (15) days after execution of the Agreement.

1. Conduct the conference to review responsibilities and personnel assignments.
2. Attendees: Owner, Owner's Representative, Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

a. Introduction of all Parties
b. Maintenance of Plant Flow and Treatment (MOPO)
c. Tentative construction schedule.
d. Critical work sequencing and long-lead items.
e. Designation of key personnel and their duties, including a list of contact informaton.
f. Lines of communications.
g. Procedures for processing field decisions and Change Orders.
h. Procedures for RFI's.
i. Procedures for testing and inspecting.
j. Procedures for processing Applications for Payment.
k. Distribution of the Contract Documents.
l. Submittal procedures.
m. Preparation of record documents.
n. Use of the premises.
o. Work restrictions.
p. Working hours.
q. Responsibility for temporary facilities and controls.
r. Dewatering.
s. Procedures for disruptions and shutdowns.
t. Construction waste management and recycling.
u. Parking availability.
v. Office, work, and storage areas.
w. Equipment deliveries and priorities.
x. First aid.
y. Security.
z. Progress cleaning.
aa. PLA compliance.
bb. Review of subcontractor approval and PLA compliance.
cc. Prevailing Wage and Certified Payroll.
dd. Confined Space Entry and Plant Safety Requirements.
ee. Payment Procedures.

4. Minutes: Owner's Representative will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned within five (5) business days of the meeting.

C. Project Closeout Conference: Contractor will schedule and conduct a Project closeout conference, at a time convenient to Owner's Representative, but no later than thirty (30) days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner's Representative and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

a. Preparation of record documents.
b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
c. Submittal of written warranties.
d. Requirements for preparing operations and maintenance data.
e. Requirements for demonstration and training.
f. Preparation of Contractor's punch list.
g. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
h. Submittal procedures.

4. Minutes: Owner's Representative will record significant discussions and agreements achieved and distribute the meeting minutes to everyone concerned within five (5) business days of the meeting.

D. Progress Meetings: Owner's Representative will schedule and conduct progress meetings at bi-monthly intervals, unless otherwise directed.

1. Attendees: In addition to representatives of Owner's Representative, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings as requested by Owner's Representative. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work. Contractors' Site Superintendent shall be required to attend all progress meetings scheduled by the Owner's Representative and shall be a competent supervisor familiar with the Work and have authority to act for the Contractor. If Contractors' Site Superintendent fails to attend any scheduled progress meetings without prior approval, Contractor shall be directed to replace the current Contractors' Site Superintendent. Non-attendance by the Contractors' Site Superintendent, will form the basis for review of the Contractor's responsible bidder status.
2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

1) Review schedule for previous and next periods.

b. Review present and future needs of each entity present, including the following:

1) Sequence of operations.
2) Status of submittals.
3) Deliveries.
4) Off-site fabrication.
5) Access.
6) Site utilization.

7) Temporary facilities and controls.
8) Progress cleaning.
9) Quality and work standards.
10) Status of correction of deficient items.
11) Field observations.
12) Status of RFI's.
13) Status of proposal requests.
14) Pending changes.
15) Status of Change Orders.
16) Pending claims and disputes.
17) Documentation of information for payment requests.
18) Review of previous 2-week and upcoming 2-week periods.

3. Minutes: Owner's Representative will record significant discussions and agreements achieved along with changes made to the 2-week look ahead and look back schedules and note all items that were not completed from the previous progress meeting. Minutes shall be distributed to all concerned parties within ten (10) business days of the meeting.
4. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

1.9 WEEKLY WORK SCHEDULES

A. Weekly work schedules shall be submitted by Contractor to Owner's Representative and Owner on a weekly basis. Schedules shall be submitted not later than 12:00 noon on the Friday preceding the planned work week. All work for the upcoming week for all Contractor and subcontractor efforts shall be shown. Each day of the week will indicate the work for that day, who is performing the work (Contractor or which sub), any equipment or large items needed to perform the work (i.e., crane, backhoe, excavator, concrete, rebar, testing personnel manufacturer's representatives, etc.). Contractor shall reimburse Owner for improper notification as required in Section 01320 – Contractor Cost for Owner's Representative Services. Please note any and all special circumstances required from Owner's Representative and/or Owner such as all shutdown, mark out assistance, conflicts with other onsite Contractors, conflicts with daily Plant operations and maintenance, non holiday days or hours off for required training for Contactor staff and events of similar nature and impact on the Project

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01310

NO TEXT THIS PAGE

SECTION 01320 – CONTRACTOR COST FOR OWNER'S REPRESENTATIVE SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. In the event that the Owner's Representative is required to provide additional office or field services as a result of substitution of materials or equipment or changes by the Contractor in dimension, weight, power requirements, etc., of the equipment and accessories provided, or as a result of Contractor's errors, omissions or failure to conform to the requirements of the Contract Documents or if the Owner's Representative is required to examine and evaluate any changes proposed by the Contractor and solely for the convenience of the Contractor; then the Owner's Representative charges in connection with such additional services shall be charged to the Contractor by the Owner.

B. In the event that the Owner's Representative is not provided with written notification a minimum 24 business hours in advance regarding the cancellation of scheduled work in accordance with the Contractor's approved construction schedule and required 2-week "look-ahead" submittals as specified in Section 01321 - Construction Progress Documentation, then the Owner's Representative charges shall be charged to the Contractor by the Owner.

C. Contractor shall keep the Owner's Representative informed of the progress of the Contractor's Work and particularly when the Contractor intends to cover Work not yet observed by the Owner's Representative and/or tested by the Contractor. All construction observations by the Owner's Representative and testing performed by the Contractor shall be completed in such a manner as not to unreasonably delay the Work. Contractor shall be charged for any additional services by the Owner's Representative when the Work is not ready at the time specified by the Contractor.

1.2 COSTS

A. Contractor shall respond to required submittals with complete information and accuracy to achieve required approvals within three (3) submissions. All costs to the Owner's Representative involved with subsequent submissions of Shop Drawings, Samples, RFI's or other items requiring approval, will be back charged to the Contractor, at the minimum rate of $1,000 per submittal or the actual cost based upon the number of hours to review the submittal times the Owner's Representative normal billing rate, whichever is greater. These costs shall be deducted from payments due for Work completed by the Contractor. In the event an approved item is requested by the Contractor to be changed or substituted for, all involved costs in the reviewing and approval process will likewise be back charged to the Contractor unless judged by the Owner's Representative that the need for such deviation from previously approved data is beyond the control of the Contractor.

B. Contractor shall provide advanced written notification a minimum 24 business hours regarding cancellation of scheduled work in accordance with the Contractor's approved construction schedule and required 2-week "look-ahead" submittals as specified in Section 01321- Construction Progress Documentation. All costs involved as a result of the Contractor's lack of advanced written notification shall be back charged to the Contractor unless judged by the Owner's Representative that the need for such deviation is beyond the control of the Contractor. The Owner will deduct and retain sufficient sums from the monies due on the Contractor's Application for Payment to cover the cost of the Owner's Representative. A minimum of four (4) hours of Owner's Representative's

time will be back charged to the Contractor at the Owner's Representative standard hourly billing rate adjusted by the appropriate premium for overtime, whether time-and-one-half, double time, or otherwise, as applicable, prior to applying the Owner's Representative multiplier.

C. Contractor shall provide advanced written notification a minimum 24 business hours regarding any delays in required observations by Owner's Representative particularly any delays in testing or covering any work. All costs involved as a result of the Contractor's lack of advanced written notification and/or the Work not ready at the time specified by the Contractor shall be back charged to the Contractor unless judged by the Owner's Representative that the need for such deviation is beyond the control of the Contractor. The Owner will deduct and retain sufficient sums from the monies due on the Contractor's Application for Payment to cover the cost of the Owner's Representative. A minimum of four (4) hours of Owner's Representative's time will be back charged to the Contractor at the Owner's Representative standard hourly billing rate adjusted by the appropriate premium for overtime, whether time-and-one-half, double time, or otherwise, as applicable, prior to applying the Owner's Representative multiplier.

PART 2 - PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01320

SECTION 01321 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Contractor's construction schedule.
2. Daily construction reports.
3. Material location reports.
4. Field condition reports.
5. Special reports.

B. Related Sections:

1. Division 01 Section "Shop Drawing Procedures" for submitting schedules and reports.

2. Division 01 Section "Project Management and Coordination" for submitting weekly work schedules.

1.3 DEFINITIONS

A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.

1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
2. Predecessor Activity: An activity that precedes another activity in the network.
3. Successor Activity: An activity that follows another activity in the network.

B. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

C. Event: The starting or ending point of an activity.

D. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.

2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

E. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Construction Schedule: Initial schedule and two week “look-aheads” of size required to display entire schedule for entire construction period and for every two week period for the entire construction period as follows:

1. Submit a working copy of schedule for entire construction period and labeled to comply with requirements for submittals. Include type of schedule (initial or updated) and date.
2. Submit two week “look-ahead” schedules for entire construction period and labeled to comply with requirements for submittals.

B. Daily Construction Reports: Submit at weekly intervals.

C. Material Location Reports: Submit at weekly intervals.

D. Field Condition Reports: Submit at time of discovery of differing conditions.

E. Special Reports: Submit at time of unusual event.

F. Qualification Data: For scheduling consultant.

G. Accident Reports: Submit immediately after accident. Address underlying cause of accident immediately.

1.5 QUALITY ASSURANCE

A. Pre-scheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints.
4. Review schedule for work of Owner's separate contracts.
5. Review time required for review of submittals and resubmittals.
6. Review requirements for tests and inspections by independent testing and inspecting agencies.
7. Review time required for completion and startup procedures.
8. Review and finalize list of construction activities to be included in schedule.
9. Review submittal requirements and procedures.
10. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities.

B. Coordinate Contractor's construction schedule with the schedule of values, submittal schedule, progress reports, payment requests, and other required schedules and reports.

1. Secure time commitments for performing critical elements of the Work from entities involved.
2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.

1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Treat each major heading as a separate numbered activity for each principal element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Owner’s Representative.
2. Procurement Activities: Include procurement process activities for long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include not less than 2 months for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion and allow time for Owner’s Representative's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include at least 60 days for punch list and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.

1. Work Restrictions: Show the effect of the following items on the schedule:

a. Coordination with existing construction.
b. Uninterruptible services.
c. Partial use before Substantial Completion.

d. Use of premises restrictions.
e. Provisions for future construction.
f. Seasonal variations.
g. Environmental control.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, completion of each segment of construction, the Notice to Proceed, Substantial Completion, and final completion.

E. Cost Correlation: At the head of schedule, provide a cost correlation line, indicating planned and actual costs. On the line, show dollar volume of the Work performed as of dates used for preparation of payment requests.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered RFIs.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.

G. Recovery Schedule: When periodic update indicates the Work is fourteen (14) or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance and date by which recovery will be accomplished.

H. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

I. Contractor's Construction Schedule: Prepare and submit two week “look-aheads” for every two-week period for the entire construction period. Label to comply with requirements for submittals.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal Gantt-chart-type, Contractor's construction schedule within five (5) days after date established for the Notice to Proceed. Base schedule on the start-up construction schedule and additional information received since the start of Project.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.

1. For construction activities that require three (3) months or longer to complete indicate an estimated completion percentage in ten percent (10%) increments within time bar.

2.3 REPORTS

A. Daily Construction Reports: Contractor shall prepare a daily construction report recording the following information concerning events at Project site:

1. List of subcontractors at Project site.
2. Approximate count of personnel at Project site.
3. Equipment at Project site.
4. Material deliveries.
5. High and low temperatures and general weather conditions, including presence of rain or snow.
6. Accidents.
7. Meetings and significant decisions.
8. Unusual events (refer to special reports).
9. Stoppages, delays, shortages, and losses.
10. Meter readings and similar recordings.
11. Emergency procedures.
12. Orders and requests of authorities having jurisdiction.
13. Change Orders received and implemented.
14. Services connected and disconnected.
15. Equipment or system tests and startups.
16. Partial completions.
17. Substantial Completions authorized.

B. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site.

C. Field Condition Reports: Immediately on discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.4 SPECIAL REPORTS

A. General: Submit special reports directly to Owner's Representative within one (1) day of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one (1) week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Owner's Representative, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.
2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

3.2 MAINTAINING SCHEDULE

A. Contractor shall perform the Work in accordance with the Project Schedule and provide all resources necessary to maintain progress of the work activities as scheduled, so that no delays are caused to other Contractors engaged in the Work.

B. Should Contractor fail to maintain progress according to the Project Schedule or cause delay to contractors, Contractor shall provide such additional manpower, equipment, additional shifts, or other measures as directed to bring the operations back on schedule.

END OF SECTION 01321

SECTION 01323 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for the following:

1. Preconstruction photographs.
2. Periodic construction photographs.
3. Final Completion construction photographs.
4. Preconstruction video.

B. Related Sections include the following:

1. Division 01 Section "Shop Drawing Procedures" for submitting photographic documentation.

1.3 SUBMITTALS

A. Submit two (2) prints of each photographic view within seven (7) days of taking photographs and two (2) sets of CD version of all photographs.

1. Format: 8-by-10-inch smooth-surface matte prints on single-weight commercial-grade photographic paper.
2. Identification: On back of each print, provide an applied label or rubber-stamped impression with the following information:

a. Name of Project.
b. Name and address of photographer.
c. Name of Owner’s Representative.
d. Name of Contractor.
e. Date photograph was taken if not date stamped by camera.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Unique sequential identifier.

3. Digital Images: Submit a complete set of digital image electronic files in JPEG format as a Project Record Document on CD-ROM. Identify electronic media with date photographs were taken. Submit images that have same aspect ratio as the sensor, uncropped.

B. Video: Submit two (2) copies of each video on DVD in MPEG Format with protective sleeve or case within seven (7) days of recording.

1. Identification: On each copy, provide an applied label with the following information:

a. Name of Project.
b. Name and address of photographer.
c. Name of Owner's Representative.
d. Name of Contractor.
e. Date videotape was recorded.
f. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.
g. Weather conditions at time of recording.

1.4 EXTRA PRINTS

A. Extra Prints: Prepare extra prints of photographs if requested by Owner's Representative.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

A. Digital Images: Provide images in JPEG format, produced by a digital camera with minimum sensor size of 8.0 megapixels, and at an image resolution of not less than 1024 by 768 pixels.

B. Video Format: Provide high-quality, DVD's of videotape images.

2.2 BINDERS

A. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pocketed inside covers.

1. If two or more binders are necessary to accommodate data of a system, organize photographs sequentially.
2. Identify each binder on front and spine, with printed title "CONSTRUCTION PHOTOGRAPHS", Project title or name, and subject matter of contents. Indicate volume number of multiple-volume sets and dates included in binder.

B. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Provide new tab for each month.

C. Protective Plastic Sleeves: All photographs shall be enclosed in transparent plastic sleeves that are punched for standard 3-ring binder.

PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.

B. Film Images:

1. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
2. Field Office Prints: Retain one set of prints of progress photographs in the field office at Project site, available at all times for reference. Identify photographs same as for those submitted to Owner's Representative.

C. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

1. Date and Time: Include date and time in filename for each image.
2. Field Office Images: Maintain one set of images on CD-ROM in the field office at Project site, available at all times for reference. Identify images same as for those submitted to Owner's Representative.

D. Preconstruction Photographs: Before starting construction, take color, digital photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Owner's Representative. All preconstruction photographs shall be reviewed by Owner and Owner's Representative for completeness and clarity. Images determined unacceptable shall be retaken at no additional cost to the Owner.

1. Flag excavation areas and construction limits before taking construction photographs.
2. Take five hundred (200) photographs to show existing conditions adjacent to property before starting the Work.
3. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.

E. Periodic Construction Photographs: Take minimum of twenty-five (25) color digital photographs monthly with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

F. Owner's Representative-Directed Construction Photographs: From time to time, Owner's Representative will instruct Contractor about number and frequency of color digital photographs and general directions on vantage points. Select actual vantage points and take photographs to show the status of construction and progress since last photographs were taken.

G. Final Completion Construction Photographs: Take five hundred (200) color photographs after date of Substantial Completion for submission as Project Record Documents. Owner's Representative will direct photographer for desired vantage points.

H. Additional Photographs: Owner's Representative may issue requests for additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.

1. Take additional photographs within 24 hours of request.
2. Circumstances that could require additional photographs include, but are not limited to, the following:

    a. Special events planned at Project site.
    b. Immediate follow-up when on-site events result in construction damage or losses.
    c. Substantial Completion of a major phase or component of the Work.
    d. Extra record photographs at time of final acceptance.
    e. Owner's request for special publicity photographs.

3.2 PRE-CONSTRUCTION VIDEOS

A. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of construction. Display continuous running time and date. At start of each video, record weather conditions from local newspaper or television and the actual temperature reading at Project site.

B. Narration: Describe scenes on video by audio narration while video is recorded. Include description of items being viewed, recent events, and planned activities. At each change in location, describe vantage point, location, direction (by compass point), and elevation or story of construction.

1. Confirm date and time at beginning and end of recording.
2. Begin each videotape with name of Project, Contractor's name, videographer's name, and Project location.
3. Entire area for all construction sites shall be adequately shown in the videotape.

C. Preconstruction Video: Before starting construction, record video of Project site and surrounding properties from different vantage points, as directed by Owner’s Representative. All preconstruction video shall be reviewed by Owner and Owner’s Representative for completeness and clarity. Video determined unacceptable shall be retaken at no additional cost to the Owner.

1. Flag excavation areas and construction limits before recording construction videotapes.
2. Show existing conditions adjacent to Project site before starting the Work.
3. Show protection efforts by Contractor.

END OF SECTION 01323

SECTION 01400 - QUALITY CONTROL

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Requirements for monitoring the quality of the constructed project.

B. Services of an independent testing laboratory for quality assurance testing. Services of the independent testing laboratory will be included by the Contractor in the price as bid.

1.2 REFERENCES

A. ASTM C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

B. ASTM D3740 - Practice for Evaluation of Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

C. ASTM D4561 - Practice for Quality Control Systems for an Inspection and Testing

D. Agency for Bituminous Paving Materials.

E. ASTM E699 - Practice for Criteria for Evaluation of Agencies Involved in Testing, Quality Assurance, and Evaluating Building Components in Accordance with Test Methods Promulgated by ASTM Committee E6.

1.3 QUALITY ASSURANCE - CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.

B. Comply with specified standards as a minimum quality for the work except when more stringent tolerances, codes, or specified requirements indicate higher standards or workmanship that is more precise.

C. Perform work by persons qualified to produce workmanship of specified quality.

D. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion or disfigurement.

E. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.

1.4 QUALITY ASSURANCE - TESTING LABORATORY

A. In order to establish compliance with the Contract Documents, materials shall be tested,

examined and evaluated before they are incorporated into the work. During and after installations, additional tests, examinations, and evaluations shall be made to determine continued compliance throughout the course of the work.

B. Testing laboratory shall be a reputable, experienced firm that is capable of performing all of the required testing and authorized to operate in the state in which the project is located.

C. Perform all sampling and testing in accordance with specified procedures and use the materials, instruments, apparatus, and equipment required by the codes, regulations and standards. Where specific testing requirements or procedures are not described, perform the testing in accordance with all pertinent codes and regulations and with recognized standards for testing.

D. In the event that samples and test specimens are not properly taken, handled, stored or delivered or if other requirements of this Section are not complied with, Owner's Representative reserves the right to delegate any or all of this work to others, or to take whatever action deemed necessary to ensure that sampling and testing are properly accomplished, for which all costs shall be borne by Contractor.

E. Owner's Representative reserves the right to disapprove the use of a specific testing laboratory, even after prior approval, if the laboratory fails to meet or comply with the requirements of this Section. If this should occur, immediately discharge the testing laboratory and retain the services of a different laboratory acceptable to Owner's Representative.

F. The testing laboratory shall meet the following criteria:

1. Be capable of performing all of the required tests.
2. Be regularly engaged in performing the types of services required.
3. Have adequate facilities, materials, equipment, and personnel to perform the services.
4. Have an adequately trained, experienced and qualified staff.
5. Have at least one registered professional engineer licensed and registered in the state in which the project is located who shall be capable of performing field tests, supervising laboratory testing and interpreting test results. The professional engineer shall be thoroughly knowledgeable in materials, soils, asphalt paving and concrete.
6. Shall be able to be on the Project site within two (2) hours after being notified.

G. Comply with the requirements of ASTM C1077, ASTM D3740, ASTM D4561 and ASTM E699.

H. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy standard traceable to either National Bureau of Standards or accepted values of natural physical constants.

1.5 REFERENCES

A. Conform to reference standards by date that the Project was last bid.

B. Obtain copies of standards when required by Contract Documents.

C. Should specified reference standards conflict with Contract Documents, request clarification from Owner's Representative before proceeding.

D. The contractual relationship of the parties to the Contract shall not be altered from the Contract Documents by mention or inference otherwise in any reference document.

1.6 SUBMITTALS

A. Within fifteen (15) calendar days from the date of the Notice to Proceed, submit documentation from the testing laboratories that clearly indicates experience, location, qualifications of staff, and descriptions of any limitations or restrictions of the firm.

B. Certified copies of each test report shall be mailed directly to the Owner's Representative. Contractor shall arrange with the laboratory to secure copies.

C. Each report shall be in writing and shall include the testing method used, the test results, the specified results, the exact location of where the test specimens were taken, the date taken, Project identification, Contractor's name and other pertinent information required for a complete and meaningful test report.

D. Each report shall be signed and certified by a responsible officer of the testing laboratory.

E. Provide reports directly to Owner's Representative within 24 hours after the sample is taken, except in those instances when tests cannot be immediately performed because of required curing, incubation periods, or lengthy testing procedures.

F. Laboratory shall verbally communicate test results when requested by the Owner's Representative. This does not eliminate nor replace the requirements for a written report.

1.7 SCHEDULING - LABORATORY SERVICES

A. Except where otherwise specified, the Owner's Representative will determine the number of samples to be taken, the date and time samples will be taken and tests made, the number and type of tests to be performed, who will collect the samples, how they will be handled and stored and when laboratory personnel are required on site.

B. Contractor will notify Owner's Representative of his decision to take samples and/or have tests made and provide him with the pertinent information. Contractor is responsible for notifying the testing laboratory and for having the testing performed, on schedule.

C. In addition to the above, Contractor shall make his own arrangements for the sampling and testing of materials he proposes to incorporate into the work. This shall not be paid for out of the cash allowance

D. Notify Owner's Representative at least 72 hours in advance of the times at which scheduled samples or tests will be conducted.

E. If samples and/or tests cannot be taken or performed when required, delay the work until such time that they can be accomplished. Any work that has been installed, but has not been sampled or tested as required, shall be evaluated by the Owner's Representative and possibly tested by other means as determined by the Owner's Representative's evaluation. Upon Owner's Representative's request, uncover any work, which has been buried or covered, and perform special tests designated by Owner's Representative. If the work cannot be tested by

other means, Owner's Representative may declare the work unacceptable. All costs associated with noncompliance and for special testing shall be borne by the Contractor.

F. Should the testing laboratory be scheduled to take or collect samples or to perform tests and finds that it is unable to do so as a result of delays in construction, inclement weather, or any other reason, reschedule the tasks for a date acceptable to the Owner's Representative. Costs associated with times testing laboratory is unable to perform scheduled services shall be borne by the Contractor.

G. Plan all work and operations to allow for the taking and collection of samples and allow adequate time for the performance of tests. Delay the progress of questionable work until the receipt of the certified test reports.

1.8 TESTING REQUIREMENTS

A. Dry Paint Thickness Measurement: Perform dry paint thickness using calibrated SSPC Type 2 fixed probe gages.

B. Compaction Testing – Soil:

1. Testing agency will test compaction of soils in place according to ASTM D 1556, Density and Unit Weight of Soil In Place by the Sand Cone Method or ASTM D 2922, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
2. When testing agency reports that subgrades, fills, or backfills have not achieved degree of compaction specified, scarify and moisten or aerate, or remove and replace soil materials to depth required; re-compact and retest until specified compaction is obtained.
3. Perform tests and analysis of fill material in accordance with ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil-Aggregate Mixtures, Using 55-lb. Rammer and 12-inch Drop.

C. CompactionTesting–Asphaltic Concrete Pavement:

1. Perform asphaltic concrete compaction testing in accordance with ASTM D2950 - Standard Test Method of Density of Bituminous Concrete in Place by Nuclear Methods.
2. Calibrate nuclear density measurement equipment based on theoretical maximum specific gravity of asphaltic concrete pavement material.
3. Perform test to determine theoretical maximum specific gravity in accordance with ASTM D2041 Theoretical Maximum Specific Gravity of Bituminous Pavement Mixtures. Perform test on mix at plant prior to delivery. Collect sample at plant in accordance with ASTM D979 - Sampling Bituminous Paving Mixtures and perform test in approved laboratory if plant does not have necessary equipment.

D. ConcreteTesting:

1. Collect samples in accordance with ASTM C172, Practice for Sampling Freshly Mixed Concrete.
2. Make test cylinders in accordance with ASTM C31, Standard Practice for Making and Curing Concrete Test Specimens in the Field.

3. Test concrete cylinders in accordance with ASTM C39, Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. Test slump and air entrainment.
5. Concrete plant inspector to perform the duties listed in Section 3.4(A)(1)(b).

E. AsphaltTesting:

1. Collect samples at point of delivery in accordance with ASTM D979, Standard Practice for Sampling Bituminous Paving Mixtures.
2. Perform extraction test in accordance with ASTM D2172, Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures.
3. Perform gradation test in accordance with ASTM C136, Method for Sieve
4. Analysis of Fine and Coarse Aggregates.

1.9 TESTING SCHEDULE

A. DryPaintThicknessMeasurement:

1. Make five (5) separate spot measurements spaced evenly over 100 square feet of area.
2. For structures exceeding 1000 square feet of finished surface, three 100 square feet areas shall be randomly selected by the engineer plus one 100 square foot area for each additional 1000 square feet of finished surface. This requirement shall be subject to change as required by the Owner's Representative.

B. CompactionTestingofSoil:

Tests will be performed at the following locations and frequencies:

1. Concrete Structures: One test per 5 vertical feet (1.5 m) of structure
2. Pavement Subgrade: One test per 500 square feet (50-sq. m) of subgrade immediately prior to placing subbase.
3. Concrete Flatwork: One test per 400 square feet (40-sq. m) of flatwork.
4. Curbing: one test per 100 linear feet (30 m).
5. Piping Installations: Compaction testing at horizontal intervals of 100 feet at the spring-line of the pipe and after each two (2) vertical feet of backfilling thereafter.
6. Precast Concrete Structures: One (1) compaction test per 500 square feet of structure.
7. Paving Aggregate Base Course: One test per 500 sq. feet (50 sq. m.) immediately prior to paving.

C. Concrete Testing: Make six (6) concrete test cylinders for each 50 c.y. or fraction thereof placed each day

1. Test two (2) cylinders at 7 days.
2. Test two (2) cylinders at 28 days.
3. The remaining cylinders shall be tested at a time to be determined by the Owner's Representative. This requirement shall be subject to change as required by the Owner's Representative.

D. AsphaltTesting: As directed by the Owner's Representative.

E. CompactionTestingofPavement: As directed by the Owner's Representative.

1.10 FIELD OBSERVATION OF CONTRACTOR'S WORK

A. The Owner's Representative will provide observation of the Contractor's work in accordance with the General Conditions of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent Work. Beginning new Work means acceptance of existing conditions. Verify that the existing substrate is capable of structural support or attachment of new Work being applied or attached. Examine and verify specific conditions described in individual specification sections. Verify that utility services are available, of the correct characteristics, and in the correct locations.

3.2 PREPARATION

A. Clean substrate surfaces prior to applying next material or substance. Seal cracks or openings of substrate prior to applying next material or substance.

B. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.3 FIELD QUALITY CONTROL

A. Allow representatives of the testing laboratory access to the work at all time. Provide all equipment, labor, materials, and facilities required by the laboratory to properly perform its functions. Cooperate with and assist laboratory personnel during the performance of their work.

B. Test specimens and samples shall be taken by the person(s) designated in other Sections, or as directed by Owner's Representative. Conduct field sampling and testing in the presence of Owner's Representative. Provide all materials, equipment, facilities and labor for securing samples and test specimens and for performing all field-testing.

3.4 FIELD INSPECTOR SCOPE OF SERVICES

A. Concrete

1. Concrete Plant Inspector

a. Qualifications: The inspector must be ACI Concrete Field Testing Technician, Grade I and have at least one year of batch plant experience.
b. The duties will include the following:

1) Perform inspection in accordance with NYSDOT Material Method MM 9.1, or as ordered by the Owner's Representative.
2) Verify that the concrete plant is currently approved by the NYSDOT and that the scales have been calibrated within the last 90 days.
3) Verify that only NYSDOT Approved materials are incorporated into the mix.
4) Observe the batching operation to insure that the specified types and amounts of materials conforming to the design mix are batched. Batch weights shall fall within the allowable tolerances.
5) Insure that the concrete delivery trucks have current NYSDOT stickers, are in good operating conditions and are not loaded beyond their capacities.
6) Verify that the resolution counter in the delivery trucks is operational and has been reset to zero.
7) Prepare a delivery ticket for each batch of concrete with the following information:

Name of Batch Plant	Date
Truck Number	Project Designation
Class of Designation of Concrete	Amount of Concrete Batched
Time Batched (Time that sand & cement make contact)	C.Y. Batch Weights

8) Sign the delivery ticket showing that the concrete batching has been inspected.

c. When not witnessing the batching operation, conduct the following tests at least twice daily:

1) Moisture content determination on fine and coarse aggregates (ASTM C566)
2) Aggregate gradations, fine and coarse (ASTM C-136)
3) Report all noted deficiencies immediately (verbally) to the designated authority
4) Provided a daily report to the Owner's Representative, within 48 hours, including all the above data including who was notified of any deficiencies.
5) Price bid shall include the technician's time and all equipment and tests necessary to perform the work as outlined above.

2. Concrete Field Inspector

a. Qualifications: The inspector must be a certified ACI Concrete Field Testing Technician, Grade I and have at least one year of experience as a concrete field inspector.

b. The duties will include the following:

1) Perform inspection in accordance with NYSDOT Material Method MM 9.2, or as ordered by the Owner's Representative.
2) Verify the ambient air temperature is within specifications for concrete placement.
3) Check plant inspection ticket for each concrete truck delivery for proper mixture and information.
4) Verify that the NYSDOT sticker is current for each concrete delivery truck and that it is loaded within the truck mixing capacity.
5) Check if the concrete has been mixed the proper number of revolutions.

c. Perform the following tests on one randomly selected delivery truck each day and each 50 cy/day, or as ordered by the Owner's Representative, at a minimum.

1) Sample the concrete (ASTM C-172)
2) Perform slump tests (ASTM C-143)
3) Check air content of concrete (ASTM C-173 or C-231)
4) Check concrete temperature
5) Cast six each 6" x 12" or 4" x 8" concrete test cylinders (ASTM C-31)
6) Check unit weight of concrete for lightweight concrete (ASTM C-567)
7) Monitor total mixing water (not to exceed specified amount)
8) Assure that test cylinders are being field cured as required (with the structure or in a properly constructed curing box furnished by the Contractor)
9) Check that maximum time for discharging of concrete has not been exceeded.
10) Verify cold or hot weather curing procedures, if required (ACI305R& 306R)
11) Report all noted deficiencies immediately (verbally) to the designated authority
12) Provided a daily report to the Owner, within 48 hours, including all the above data including who was notified of any deficiencies.
13) Price bid shall include the technician's time and all equipment and tests necessary to perform the work as outlined above.

3. Concrete Construction Special Inspector

a. Qualifications: The inspector must be ACI Concrete Construction Special Inspector and have at least one year of experience.
b. The duties will include the following:

1) Inspect formwork erection and removal (ACI 347R & SP-4).
2) Inspect reshoring (ACI 347R).
3) Inspect reinforcing bars (grade, mill test certificates, bends, placement) (ACI 318 and CRSI "Placing Reinforcing Bars" and "Manual of Standard Practice", shop drawings and contract plans).
4) Check for correct anchor bolt size and placement in accordance with shop drawings and/or plans.
5) Check that proper soil bearing capacity has been verified by a licensed P.E. before placing of foundation concrete.
6) Inspect placement of concrete (including vibration) (ACI 304R & 309R).
7) Inspect finishing operations (ACI 302.1R & 301)

8) Inspect curing (ACI308).
9) Verify hot and cold weather procedures, if required (ACI 305R & 306R)
10) Report all noted deficiencies immediately (verbally) to designated authority.
11) Provide a daily report to the Owner, within 48 hours, including all the above data including who was notified of any deficiencies.
12) At the conclusions of all testing provide to the Owner a Final Certification Letter stating that there are no unremediated deficiencies and all work conforms to the above requirements.
13) Price bid shall include the technician's time and all equipment and tests necessary to perform the work as outlined above.

4. Precast Concrete Plant Or Field Inspector (Local And Out- Of-Town)

a. Qualifications: The inspector must be an ACI Concrete Construction Special Inspector, or a certified Precast/Prestressed Concrete Institute (PCI), Plant Quality Personnel Certification Level II, and have at least one year of experience as a precast concrete plant inspector.
b. The duties will include the following:

1) Perform inspection in accordance with NYSDOT Precast/ Prestressed Concrete Construction Manual (PCCM), approved shop drawings and contract plan.
2) Review contractor's (supplier's) quality control program.
3) Review certifications and calibrations of scales, jacks, prestress strands, inserts, concrete mix designs, reinforcing steel, etc.
4) Monitor bed set up for cleanliness of forms, dimensions, skew distances, strand deflection, strand tensioning and elongation, reinforcing steel, plates, blockouts, inserts, and other pertinent items contained within the members.
5) Monitor concrete batching and observe placement. Monitor quality control sampling and testing performed by suppliers.
6) Obtain records of curing times and temperatures.
7) Witness compressive strength test of cylinders prior to detensioning, stripping & shipping, as required.
8) Witness detensioning process and sequence.
9) Check finished product for dimensions, camber, alignment, chamfers, blockouts, studs, inserts, cracks, surface texture, etc.
10) Inspect pieces at time of shipping for finish and patching, strand slippage, cracks and blocking and if found acceptable stamp or stencil date of acceptance.
11) Report all noted deficiencies immediately (verbally) to the designated authority.
12) Provide a daily report to the Owner, within 48 hours, including all the above data including who was notified of any deficiencies.
13) Price bid shall include the technician's time and all equipment and tests necessary to perform the work as outlined above.

B. Asphalt

1. Asphalt Plant Inspector (Not Superpave QA Technician)

a. Qualifications: The technician must be NYSDOT qualified or equal and have at least two years of plant inspection experience.
b. The duties will include the following:

1) Perform inspection in accordance with NYSDOT Materials Manual 5, or as ordered by the Owner's Representative.
2) Verify that the asphalt plant is currently approved by NYSDOT and that the scales have been calibrated within the last 90 days.
3) Verify that only NYSDOT approved materials are incorporated in the mixes.
4) Check to see that the correct aggregate sources and sizes are in the proper cold feed bins.
5) Verify that the proper aggregate and asphalt batch weights, complying with the approved job mix formulas, are programmed into the batching computer.
6) Check to see that the control panel is in the automatic mode and that the aggregate, mineral filler (if used) and asphalt interlocks are turned on.
7) Observe the scales, automatic hatching controls and recorder when production begins and periodically thereafter to see if they are working properly.
8) Check 100% of the batch weight recordation to verify that the weight tolerance interlocks are working and the correct tolerances are being used.
9) Explain any system tolerance overrides.
10) Test trucks at random to make sure mix is being shipped at the correct temperature.
11) Sample asphalt, aggregate and mixes for analysis as required.
12) Perform hot bin analysis or bumoff and check for gradation conformance, as required.
13) Issue an inspection ticket to verify to the field that the asphalt batching has been inspected.
14) Report all noted deficiencies immediately (verbally) to the designated authority.
15) Provide a daily report to the Owner, within 48 hours, including all the above data including who was notified of any deficiencies.
16) Price bid shall include the technicians time and all equipment and tests necessary to perform the work as outlined above

2. Asphalt Plant Inspector (Superpave QA Technician)

a. Qualifications: The technician must be New York Construction Materials Association certified as QC / QA Technician Hot Mix Asphalt, and have at least two years of field inspection experience.
b. The duties will include the following:

1) Perform all duties of sampling and testing of Superpave mixtures as a Quality Assurance (QA) technician as listed in the current edition of NY State Specifications, and Materials Procedure No. 401 "Quality Control and Quality Assurance Procedures for Hot Mix Asphalt (HMA) Production", or as ordered by the Owner's Representative.
2) When NYSDOT Series 50 or 60 compaction of Superpave mixtures is specified; perform tests on cores and loose material, as delivered, according to Materials Procedure MP 402-02 "Hot Mix Asphalt (HMA) Pavement

Density Determination", Section IV: "Determination of Pavement Core % of Mixture Maximum Theoretical Density (%MMTD)" in an approved Laboratory.

3) Report all noted deficiencies immediately (verbally) to the designated authority.
4) Provide a daily report to the Owner, within 48 hours, including all the above data including who was notified of any deficiencies.
5) Price bid shall include the technicians time and all equipment necessary to perform all tests at the asphalt plant. Tests to determine
6) %MMTD per test strip or per lot (4 pavement cores & 4 loose materials samples) shall be priced separately.

3. Asphalt Field Inspector

a. Qualifications: The technician must be New York Construction Materials Association certified as QC / QA Technician Hot Mix Asphalt, and have at least two years of field inspection experience.
b. The duties will include the following:

1) Verify that equipment meets specifications.
2) Check incoming trucks for inspection tickets.
3) Inspect trucks for proper mix temperature.
4) Monitor laydown for proper mat placement and texture.
5) Inspect thickness of mat and yield.
6) Take samples as required.
7) Test for compaction per NYSDOT MP 402-02 or ASTM 02950 using a nuclear density gauge in backscatter mode, or as ordered by the Owner's Representative.
8) Report all noted deficiencies immediately (verbally) to the designated authority.
9) Provide a daily report to the Owner, within 48 hours, including all the above data including who was notified of any deficiencies.
10) Price bid shall include the technician's time and all equipment and tests necessary to perform the work as outlined above.

C. Soils

1. Soil Technician

a. Qualifications: Technician's must be North East Transportation Training & Certification Program (NETTCP), Soil & Aggregate Inspector certified, or equal, and have at least two years of experience.
b. The duties will include the following:

1) Inspect fill / backfill materials to verify they meet specifications. b) Inspect fill / backfill compaction operations and thickness of lifts.
2) Perform tests per ASTM D-6938 using a nuclear density gauge in Direct Transmission mode only.
3) Perform field proctor tests, at least once per day, per type and source of fill / backfill material.

4) Provide a daily report to the Owner, within 48 hours, including all the above data including who was notified of any deficiencies.
5) Price bid shall include the technician's time and all equipment and tests necessary to perform the work as outlined above.

2. Soil Bearing Capacity Inspection For Foundations

a. Qualifications: Licensed Professional Engineer with at least two years of geotechnical/foundation experience.

b. The duties will include the following:

1) Inspect all materials at the final foundation elevation for conformance to the design assumptions.
2) Perform all appropriate tests and record all test results including, quality and quantity of fill/ backfill material placed and number and thickness of lifts.
3) Report all noted deficiencies immediately (verbally) to designated authority.
4) Provide a daily report to the Owner, within 48 hours, including all the above data, including who was notified of any deficiencies.
5) Price bid shall include the technician's time and all equipment and tests necessary to perform the work as outlined above.

END OF SECTION 01400

SECTION 01500 – TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes requirements for mobilization/demobilization temporary utilities, support facilities, and security and protection facilities.

B. Related Sections:

1. Division 01 Section "Summary" for work restrictions and limitations on utility interruptions.
2. Division 01 Section "Cleaning" for progress cleaning requirements.

1.3 USE CHARGES

A. General: Installation and removal of and use charges for temporary facilities, where applicable, shall be included in the Contractors bid price. Allow other entities to use temporary services and facilities without cost, including, but not limited to Owner's construction forces, Owner's Representative, other Contractors, Engineers, testing agencies, and authorities having jurisdiction.

B. Sanitary Facilities: Pay and provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

C. Water Service: Provide electric water meter at each source utilized. Contractor, Owner and Owner's Representative shall verify meter reading at start and completion of use of water for the Project. Pay water service use charges for water used by all entities for construction operations.

D. Electric Power Service: Provide electric meter at each source utilized. Contractor, Owner and Owner's Representative shall verify meter reading at start and completion of use of electric for the Project. Pay electric power service use charges for electricity used by all entities for construction operations.

E. Telephone/Cell Phone Service: Pay telephone/cell phone service use charges for telephone/cell phone/fax use by all entities for construction operations.

1.4 INFORMATIONAL SUBMITTALS

A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel as specified in the Contract Documents. Owner and Owner's Representative to review. Contractor to modify as necessary and as directed by Owner and/or Owner's Representative and at no additional cost to the Owner.

1.5 QUALITY ASSURANCE

A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.

B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.6 PROJECT CONDITIONS

A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

B. Materials and facilities required for mobilization shall conform to the Contract Documents and any pertinent Local or State law, regulation, or code.

C. Mobilization work required to provide all temporary facilities and services for mobilization shall be done in a safe and workmanlike manner and shall conform with any pertinent local and state law, regulation, or code. Good housekeeping, consistent with safety, shall be maintained.

1.7 PROGRESS PAYMENTS

A. All costs under this section shall be prorated over the duration of the Project and paid monthly over the duration of the Project

PART 2 - PRODUCTS

2.1 TEMPORARY FACILITIES

A. Contractor shall prepare a Site Utilization Plan (SUP) showing staging areas, parking areas, stockpile areas, debris container areas, unloading areas, and trailer areas for review by the Owner and Owner's Representative.

B. Evaluate and provide updated site utilization plans monthly, as necessary. Each update shall be submitted to the Owner and Owner's Representative for information purposes and be provided by the last Friday of every month.

C. Contractor must install temporary security fencing around staging areas. Owner and Owner's Representative will not be responsible for any stolen items and access control.

D. Meeting(s) will be held at the site with all concerned parties to assist the Contractor in developing the criteria for the plan. During these meeting(s), all parties will present their needs and requirements for site utilization. Representatives from the local municipality or utility companies may be attending. The requirements of the local municipality and utility companies shall be incorporated into the SUP.

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

F. Contractor, by submitting a bid, understands the importance of a workable SUP and also understands that the Owner's Representative may be required to select a plan for the contractor to adopt that is not ideal to the planned construction activities anticipated before the bid was submitted. There shall be no claims for damages associated with site utilization. If the Contractor fails to prepare the SUP as stipulated above, then the Owner reserves the right to back charge the Contractor for the costs associated with having a Site Utilization Plan developed.

G. If a Contractor fails to participate or attend the meetings scheduled to develop the SUP then the Contractor will forfeit any right to comment on the plan that is developed.

H. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.

I. Project Field Office: Field Office shall be equipped with anchor/tie down systems for hurricane wind loads, fully skirted and of sufficient size to accommodate the needs of Owner's Representative and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Field office shall be kept clean and orderly by providing minimum weekly garbage removal and cleaning services (including vacuuming and/or mopping of floors) throughout Project duration. Furnish and equip office as follows:

1. Furniture required to accommodate the needs of construction personnel office activities.
2. Conference room of sufficient size to accommodate meetings of ten (10) individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot-square tack and marker boards.
3. Drinking water and private toilet.
4. Coffee machine and supplies.
5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 70°F +/- 5°.
6. Lighting fixtures capable of maintaining average illumination of 100 fc at desk height.
7. Telephone Service including one (1) separate telephone line, one (1) separate fax/modem line, one (1) digital answering machine and one (1) telephone.
8. Combination Fax/Plain Paper Printer/Copy Machine/Scanner/Photo Printer.
9. Fire extinguisher - Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
10. First aid facilities - Contractor shall have at the site of Work an approved First Aid Kit accessible at all time.

11. Internet Service.
12. Cellular Telephones/Two-Way Radios.

J. All facilities, materials and equipment provided under this Section shall be provided and maintained in good working order at all times. Any materials or equipment that malfunctions shall be repaired or replaced at no additional cost to Owner.

K. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

1. Store combustible materials apart from building.
2. Project materials and supplies that must be stored outside of the elements.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

1. Exact location of temporary field trailers, portable sanitary facilities and temporary utilities shall be determined and agreed to at a meeting with the Contractor, Owner and Owner's Representative.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

C. Contractor shall comply with all noise, vibration, fume, dust, vapor and gas regulations.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Water Service: Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use. Provide backflow prevention device in accordance with Owner's requirements. Provide water meters(s) necessary to measure water usage during construction. Contractor, Owner and Owner's Representative shall verify meter readings for the Project. Usage shall be back charged to the Contractor at rate paid by Owner.

C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

D. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service overhead, unless otherwise indicated.
2. Connect temporary service to local utility and as directed by Owner.
3. Contractor shall provide electric meters(s) necessary to measure electric usage during construction. Usage shall be charged to the Contractor by the owning utility.

E. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.

F. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install telephone lines for each field office.

1. Provide additional telephone lines for the following:

a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list of important telephone numbers.

a. Police and fire departments.
b. Ambulance service.
c. Contractor's home office.
d. Owner’s Representative's office.
e. Owner's office.
f. Principal subcontractors' field and home offices.
g. Contact information for all contract parties 24/7 (Owner, Owner’s Representation and Contractor).

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:

1. Owner facilities, equipment, personnel, materials, specialty, supplies and conveyances shall not be utilized at anytime by Contractor or his subcontractor(s) or any worker without written permission by Owner. In order to obtain written permission for use of any Owner item, except personnel, it shall be necessary for Contractor to obtain such qualified manufacturer representatives that shall certify in writing that the item requested for use can be accommodated by the item for the intended use. Further, all maintenance on the item to make the item certifiable by the manufacturer’s representative and to keep the item in operating condition shall be paid for by the Contractor intending to use the item for the duration of the construction. The use of the equipment, material, facility, specialty, supply or conveyance shall be back charged at a unit rate to the Contractor for each usage at 4 hour minimum time for each day the item is used.
2. Owner staff, if needed for anything other than plan shutdowns and emergencies, shall be requested in writing at least 96 hours prior to the anticipated need for them. Owner shall be reimbursed for actual costs including benefits and administrative costs with a

multiplier of 3 for all Owner staff work. Regardless of any activity all overtime costs for any Owner employee, shall be reimbursed to the Owner by a back charge to the Contractor that shall be deducted from that month's payment request.

3. Provide construction for temporary offices, shops, and sheds located within construction area.
4. Maintain support facilities until Owner's Representative schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Roads and Paved Areas: Construct and maintain temporary roads and paved areas, as required and adequate for construction operations.

1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust. Keep dust within the Project site to a minimum at all times.

C. Traffic Controls: Comply with requirements of authorities having jurisdiction.

1. Protect existing site improvements to remain including curbs, pavement, and utilities.
2. Maintain access for fire-fighting equipment and access to fire hydrants.
3. Contractor shall be responsibility to maintain traffic access to all Owner facilities on a 24-hour per day, 7-day per week basis. Traffic maintenance shall be maintained by whatever means necessary at all times by the Contractor and at no additional cost to the Owner.

D. Parking: Contractor shall provide temporary parking for construction personnel.

E. Dewatering Facilities and Drains: Dewatering shall require permits and permitted discharge(s). Contractor shall obtain all required permits and provide detailed dewatering plan signed and sealed by a Professional Engineer licensed and registered in the State of New York and with a minimum five (5) years experience in the design and construction of dewatering systems. Contractor shall not discharge groundwater directly into creeks, ponds, lakes or waterways without first obtaining approval(s) and/or proper permit(s) from all applicable regulatory agencies. Before discharge into surface waters, dewatering effluents must be filtered through hay bales or detained settling basins to avoid sedimentation to the receiving waters. If necessary, baffling devices shall be used to prevent the scouring of the bed or banks of any receiving stream.

F. Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.

1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
2. Remove snow and ice as required to minimize accumulations and provide for safe work environment.

G. Project Signs: No signs or advertisements of any nature will be permitted on the Project without prior approval of the Owner's Representative.

1. Provide signs, as required, to clearly direct deliveries to a location by the Contractor trailer for inspection prior to off loading (if found to be acceptable for off loading).

2. Provide traffic signs indicating temporary changes to normal traffic flow on site.
3. Provide temporary, directional signs for construction personnel and visitors.
4. If required, insert a list of necessary signs and add Project-specific provisions such as special graphics and special lighting.
5. Maintain and touchup signs so they are legible at all times.

H. Waste Disposal:

1. Provide waste-collection containers in sizes adequate to handle waste from construction operations.
2. Comply with requirements of authorities having jurisdiction.
3. Comply with Division 01 Section "Cleaning" for progress cleaning requirements.
4. Provide systems for controlling and managing solid waste related to the Work.
5. Prevent solid waste from becoming airborne, and from discharging to surface waters and drainage routes.
6. Properly handle and dispose of solid waste.

I. Lifts and Hoists: Provide facilities necessary for hoisting materials.

J. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

K. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

L. Noise control enclosures may be necessary for dewatering and/or bypass pumping. All efforts shall be made by all parties to avoid the erection/construction of temporary enclosures to reduce noise but, if deemed necessary by the Owner and/or Owner's Representative, Contractor shall erect/construct these temporary facilities at no additional cost to the Owner. Contractor vehicles and equipment shall minimize noise to greatest degree practicable. Noise levels shall conform to Laws and Regulations, including OSHA requirements and local ordinances. Noise levels shall not interfere with the work of Owner or others.

M. Dust Control

1. Control objectionable dust caused by Contractor's operation of vehicles and equipment, clearing, or other actions. To minimize airborne dust, apply water or use other methods subject to acceptance of Owner's Representative and approval of authorities having jurisdiction.
2. Provide necessary labor, materials, equipment, and incidentals to apply sufficient dust suppressants; properly clean all track-out areas to driveways, roadways, and highways, and provide adequate physical stabilizations of soils to comply with accepted dust control plan. Control fugitive dust generation from Contractor's operations including the following areas:

    a. Construction areas.

b. Vehicle and equipment parking areas.
c. Material and equipment storage areas.
d. Site office, trailer, and staging areas.
e. Haul and access roadways.
f. Track-out areas.
g. Other areas where Contractor will work, store materials or equipment, or park vehicles and equipment.

3. Do not cause or allow dust generating operations, earthmoving operations, use of property, or other operations that result in fugitive dust emissions that exceed limits prescribed by authorities having jurisdiction

N. Pollution Control

1. Pollution Control – General:

a. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere caused by discharge of noxious substances from construction operations.
b. Equipment used during construction shall conform to federal, state, and local Laws and Regulations.

2. Spills and Contamination:

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

O. Atmospheric Pollutants:

1. Provide systems for controlling atmospheric pollutants related to the Work.
2. Prevent toxic concentrations of chemicals.
3. Prevent harmful dispersal of pollutants into atmosphere.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways in accordance with the New York State (NYS) Standards and Specifications for Erosion and Sediment Controls and NYS Stormwater Design Manual. Measures shall cover temporary facility area and all construction sites.

1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
2. Inspect, repair, and maintain erosion- and sedimentation-control measures during

construction until permanent vegetation has been established.

3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains. Protect all new work and existing structures from stormwater and flooding. Implement special measures to prevent harmful substances from entering surface waters. Prevent disposal of wastes, effluents, chemicals, or other such substances in or adjacent to surface waters and open drainage routes, in sanitary sewers, or in storm sewers. 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 to prevent erosion, damage, or nuisance. Provide, operate, and maintain equipment and facilities of adequate size to control surface water. Dispose of drainage water in manner to prevent flooding, erosion, and other damage to any and all parts of the Site and adjoining areas, and that conforms to Laws and Regulations.

D. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

E. Site Enclosure Fence: Before construction operations begin, Contractor shall provide 6" high chain link site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Submittal: Submit drawing identifying plan and details of materials and construction of site enclosure fence.
2. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
3. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Furnish four (4) sets of keys for each lock to Owner**.**

F. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday. Contractor shall be responsible to protect all new work and existing structures.

G. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

H. Safety fence shall be four (4) ft. high and made from UV stabilized extruded polypropylene. Color shall be bright orange. Safety fence shall be lightweight, durable, and highly visible. Wood posts shall be hardwood, four (4) inches diameter minimum, embedded minimum three (3) feet in the ground and spaced maximum eight (8) feet.

I. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Obtain extended warranty for Owner. Perform control operations lawfully, using

environmentally safe materials. Employ methods and use materials that do not adversely affect conditions at the Site or on adjoining properties.

3.5 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Termination and Removal: Remove each temporary facility when need for its service has ended, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of Contractor.
2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. Work areas shall be left clean and in neat condition, temporary items removed, any and all damage repaired, and all refuse removed. All cleaning shall be done in a manner acceptable to the Owner and Owner's Representative.
4. Restore pavements, walks, curbs, lawns, and other exterior surfaces damaged during performance of the Work to match the appearance and performance of existing corresponding surfaces as closely as practicable.
5. Topsoil and seed or sod lawn areas damaged during performance of the Work and new lawn areas inside the limits of the performance of the Work. Contractor shall water as required until physical completion of the Work.
6. Repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section Closeout Procedures.

3.6 CLOSEOUT

A. At the conclusion of the Work, all equipment, tools, temporary structures, and materials belonging to the Contractor shall be promptly taken away; he shall remove and promptly dispose of all debris, rubbish, or any foreign substances.

B. All temporary sanitary facilities shall be removed entirely from the job and the site and all appurtenances restored to as new condition.

END OF SECTION 01500

SECTION 01526 – TRAFFIC MAINTENANCE AND PROTECTION

PART 1 - GENERAL

1.1 SCOPE

A. This section includes provisions for maintaining vehicular and pedestrian traffic and protection for both the public and Contractor's employees and personnel from all damage to person and property within the limits of and for the duration of the Contract. The work shall include watchman services, all temporary fencing, temporary and permanent striping and the furnishing of all labor, materials, tools and equipment necessary to satisfactorily maintain all traffic for the duration of the Contract. A deduction of four-hundred (400) dollars will be made per eight (8) hour shift for the watchmen services not provided. The amount may be deducted from any monies due the Contractor on this Contract.

B. If, in the judgment of the Owner, Owner's Representative, County, Town, and/or Village, traffic is not properly and safely maintained on any part of the Contract on any one (1) day, or the Contractor fails to comply with the approved plans, schedules and/or amendments, no payment for maintenance of traffic will be made for that day. The amount of such daily non-payment will be determined by dividing the schedule of value for this item by the number of calendar days between the date of notice to proceed and the date of completion as designated in the agreement without regard to any extension of time.

C. Should the Contractor fail or refuse to maintain traffic as specified or as ordered by the Owner, Owner's Representative, County, Town, and/or Village, then the Owner shall have the right to perform this work with its own personnel and equipment, and/or personnel and equipment hired from outside sources. The entire cost of the work by such forces, materials and equipment shall be deducted from any monies due the Contractor on this Contract. The cost of this work shall be in addition to the daily non-payment deductions listed above.

1.2 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and other Division 01 Specification Sections, apply to this Section.

1.3 SUBMITTALS

A. Contractor shall notify local (County, Town, and/or Village) Traffic Departments, Owner and Owner's Representative at least seventy-two (72) hours prior to the closing of any portion of a road necessary to perform the Work and shall adequately describe the detour to be followed.

B. Maintenance of traffic plan and schedule of operations for the maintenance, protection and detouring of traffic shall meet the following minimum requirements and shall be submitted to the appropriate roadway owner:

1. Plans showing all locations and type of barricades, safety devices, signs and temporary striping conforming to the Federal Manual of Uniform Traffic Control Devices (MUTCD) Highway Work Zone Traffic Control, current edition and New York State Department of Transportation (NYSDOT) supplements and to the satisfaction of the road owner, Owner and/or Owner's

Representative.

2. Plans showing in detail the methods, sequences, procedures and facilities Contractor proposes to use for the maintenance and protection of traffic on all roads affected to perform the required Work.
3. Approval of these traffic maintenance plans are intended only as an outline of minimum requirements and the provisions of the Contract Documents do not in any way lessen the Contractor's responsibility to maintain vehicular and pedestrian traffic and to protect the public and his own employees from all damage to person and property. Adjustments in the field may be required, as the County, Town, Village, Owner and/or Owner's Representative deems necessary.
4. If the Contractor proposes any modifications, amendments or changes in location for detours as called for, or proposes new detours, such changes and additions to the maintenance of traffic plan must be approved in writing by the County.
5. For work within County, Town and Village right-of-ways, the Contractor shall submit traffic maintenance drawings for approval. The maintenance of traffic drawings shall be submitted within thirty (30) days after Contract award. These drawings shall be submitted even if maintenance of traffic drawings are included with the Contract Documents. No work will start on any County, Town and/or Village right-of-way prior to the Contractor receiving approval.
6. (NIC) Traffic maintenance details shown in the Contract Documents for work in State right-of-ways are intended to outline a method of maintaining traffic conforming with State requirements. Contractor shall submit traffic maintenance drawings where he intends to deviate from these details and will be required to submit a detailed account of the construction within State right-of-ways showing phases of construction, time schedule, shop drawings, etc., for approval.
7. The maintenance of traffic drawings shall meet the following requirements:
    a. Drawings shall be prepared and signed by a Professional Engineer with a current license and registration in the State of New York.
    b. They shall be presented on twenty-four (24) inch by thirty-six (36) inch sheets to a scale of 1 inch = 40 feet or 1 inch =50 feet.
    c. Drawings shall show all locations and type of barricades, safety devices, signs and temporary striping.
8. Contractor shall submit for approval, all persons or service contracts that he intends to use during non-working hours for providing watchmen patrol of the Contract Site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Comply with the requirements of Federal MUTCD and NYSDOT supplements material specifications as they apply to the various materials required for the Work of this Section.

B. Provide sign panels of aluminum, galvanized steel or plywood with faces of reflective sheet material and non-reflective black characters conforming to Federal MUTCD and NYSDOT supplements.

C. Provide delineators, barricades and lighting for construction barricades in accordance with the requirements of Federal MUTCD and NYSDOT supplements. Where reflective materials are required, conform to Federal MUTCD and NYSDOT supplements except where glass or plastic buttons are used as delineators. Barricades, cones and drums may use reflective materials conforming to Federal MUTCD and NYSDOT supplements.

D. Provide pavement delineation of reflective paint or reflective pressure sensitive pavement marking tape. Line segments shall be a minimum of 4 inches wide and 36 inches long applied with the long axis of the segment parallel to the direction of traffic.

E. Unless otherwise specified, all materials and equipment used will remain the property of the Contractor.

PART 3 - EXECUTION

3.1 PREPARATION

A. Contractor shall obtain, supply and pay all required electrical energy, services, permits and certificates.

3.2 GENERAL

A. Remove construction equipment and materials from roadway during non-working hours or provide protection in such a manner that they will not constitute a traffic hazard.

B. Conduct and schedule the Work in a manner that will minimize the time during which the traveling public will be exposed to hazards.

C. Do not park employee personal vehicles within the work area in a manner that they will constitute a traffic hazard.

D. Provide a traveled way suitable for two lanes of moving traffic. Keep traveled way reasonably smooth and hard at all times.

E. Keep the traveled way of all public highways utilized for hauling materials to or from this Project free of foreign objects that may fall or drop from transporting vehicles.

F. Correct dusty conditions resulting from the Work by the use of calcium chloride and/or water. Distribute water uniformly by the use of suitable spray heads or spray bar. The Owner, Owner's Representative, County, Town or Village will determine the need for the application of water for dust control. Apply water at the intervals and locations ordered by the Owner, Owner's Representative, County, Town or Village.

G. Whenever it becomes necessary to maintain traffic on one lane, provide adequate traffic controls on the section of roadway on which vehicle traffic is maintained. Provide competent flag persons or traffic signals at the location which will in the judgment of the Owner, Owner's Representative, County, Town or Village adequately and continuously control one lane traffic.

H. Maintain safe and adequate ingress and egress to and from intersecting highways, residences and commercial establishments.

I. Contractor shall not be responsible for removal of snow and ice from pavements or traveled ways open to public vehicular traffic.

J. Maintain existing and new drainage structures, culverts and ditches to adequately drain the traveled way.

K. Provide, maintain, move and remove delineation and guiding devices to properly delineate a safe and reasonable roadway. Delineate areas on which it is unsafe to travel.

L. Delineate drop-offs less than 6 inches by providing approved delineators at intervals of not more than 200 feet. Where the drop off is between 6 inches and 18 inches, the spacing between delineators shall not be more than 100 feet. Where the drop off is greater than 18 inches, a continuous delineation consisting of 2 inch or wider brightly colored flexible tape shall be used in addition to individual delineators provided they are properly painted and reflectorized in accordance with Federal MUTCD and NYSDOT supplements.

M. Maintain existing highway signs, markers, delineators and their supports. Where necessary, relocate existing signs in conformance with Federal MUTCD and NYSDOT supplements. Replace signs lost or damaged as a result of contract operations.

3.3 PERFORMANCE

A. Before the Contractor shall in any way or manner restrict or interfere with the normal flow of traffic, he must first secure written approval of his proposed plan and obtain any required permit(s).

B. If, in the opinion of the road owner, maintenance and protection of traffic is not adequate, the Owner, Owner's Representative, County, Town and/or Village may order the work done by others and deduct the actual cost from payments due to the Contractor.

C. Traffic shall be maintained over a reasonably smooth traveled way and shall be marked by signs, delineators, guiding devices and/or other acceptable methods so that a person who has no knowledge of the conditions can safely and with minimal discomfort and inconvenience, travel the area under construction. Maintenance of traffic shall be in conformance with the Federal MUTCD and NYSDOT supplements.

D. Adequate advance warning must be provided whenever traffic is interfered with or lanes are closed. All signs, markings, signals, barricades, lighting devices and flagger operations shall conform to the Federal MUTCD and NYSDOT supplements. All necessary traffic control devices shall be in place prior to commencement of the particular construction operation. In case of emergency construction, where there is not sufficient time to prepare a traffic plan, the Contractor shall be responsible for following the guidelines set forth in the Federal MUTCD and NYSDOT supplements.

E. Access for emergency vehicles is of the utmost importance and provision shall be made by the Contractor to provide and maintain such access at all times. Special attention shall also be given to maintenance of a satisfactory travel over weekends, holidays and nights.

F. Contractor shall generally maintain two-way traffic on streets where Work is in progress. At no time shall Contractor work on both sides of the street. Access to driveways and parking lots shall be maintained at all times, unless otherwise approved by the Owner, Owner's Representative, NYSDOT, Town, County and/or Village. Contractor shall devote particular attention to all drainage facilities, keeping them fully operational at all times.

G. For the duration of the Contract, Contractor shall maintain within the contract limits the entire pavement, drainage and sewage facilities and other street elements unless otherwise specified. Foreign objects, sand, rocks, spillage of materials shall immediately be removed and the area cleaned to the satisfaction of the Owner, Owner's Representative, County, Town and/or Village.

Spillage outside the contract limits is the Contractor's responsibility and he shall pay the cost for work necessary to clean the areas affected

H. Traffic delays shall be kept to a minimum. A period of five (5) minutes shall be considered the maximum time allowed for stopping traffic.

I. Signs, barricades and other facilities shall be furnished and erected as required for on the approved Plan and/or as directed by the Owner, Owner's Representative, County, Town and/or Village.

J. Contractor shall be responsible for notifying all interested agencies when construction will interfere with normal traffic flow. These agencies include, but are not necessarily limited to:

1. New York State, Suffolk County and Local Police
2. Local Fire Department(s)
3. School District(s)
4. Suffolk County Unit of Traffic Engineering (for County roads).
5. Local Traffic Departments and Departments of Public Works.
6. Suffolk County Transit.

K. Contractor shall not be permitted to store soil, materials, equipment or supplies that will interfere with sight distances, within thirty (30) feet of an intersection or areas where visibility is critical.

L. Contractor shall construct and maintain, as directed by the Owner, Owner's Representative, County, Town and/or Village, temporary bridges or bridging over excavations, obstructions and newly laid pavements to provide access for pedestrian and vehicular traffic and access to fire hydrants. During construction, Contractor shall take particular care to allow for ingress and egress of emergency vehicles from fire houses, police stations, hospitals, etc.

M. Street signs, route markers and other signs that fall under public jurisdiction (i.e., bus stop, stop signs, parking signs, etc.) shall be protected and maintained.

N. Contractor shall provide protection from damage to persons or properties.

O. All signs, lights, barricades and other materials installed to direct or warn the traveling public shall be maintained, repaired and replaced by the Contractor. Vandalism or theft shall not preclude the Contractor from meeting the specified requirements. Signs, barricades, warnings or devices shall be placed and lighted as to give timely warning and permit the motorist to take the necessary action to traverse the area safely.

P. Special attention shall be given to traffic maintenance during non-working hours, weekends, holidays and other periods or temporary shutdown of work. Adequate provision shall be made for business and commercial establishments, schools, and public buildings. In general, normal traffic flow shall be restored to each road during nonworking hours.

Q. Materials, equipment and workmanship for lighted barricades shall be in strict compliance with the National Electric Code and only licensed electricians may perform the work.

R. Signs or markers lost, damaged or removed without the Owner, Owner's Representative, County, Town and/or Village approval shall be replaced at no cost to the Owner.

S. In the case of traffic being diverted from the accustomed traveled way, onto the road shoulder or

onto an area not immediately affected by the actual construction work, occasioned by the location of materials or equipment, the shoulder or areas outside of the project so affected, shall be restored to a condition equal to the original condition. This shall apply equally as well to those pavements or any detours or designated areas over which traffic was routed.

3.4 FLAGMAN

A. Contractor shall provide a sufficient number of competent flagmen and/or temporary lights operating continuously during the time traffic is so maintained and as requested by the Owner, Owner's Representative, County, Town and/or Village. Flagmen shall have no other function other than to direct traffic. Flagmen shall wear safety vests and shall direct traffic with a red flag as required by the Federal MUTCD and NYSDOT supplements.

B. Contractor shall provide a sufficient number of competent flagmen in areas where traffic is congested, particularly where construction equipment is operating.

3.5 TRAFFIC SIGNAL MAINTENANCE

A. Maintenance of the traffic signals shall be in accordance with Federal MUTCD and NYSDOT supplements and latest Suffolk County Traffic Engineering Department.

B. Contractor shall protect traffic signal equipment and cables from any damage or malfunctioning.

C. County, Town and/or Village traffic signals and electronically operated traffic control devices within the Contract area limits will continue to be maintained by the County, Town and/or Village during construction, except when a traffic signal or electronically operated traffic control device is physically damaged by construction under this Contract. Such conditions as the removal or shoring of the signal support poles, detector removals, or any malfunction or change to the operation of the signals caused by the construction, shall oblige the Contractor to immediately have the signals repaired to enable their continued operation.

D. Suffolk County Traffic Engineering Department shall be immediately notified of any damage, malfunction, or for a final inspection of the traffic signal equipment within the Contract limits.

E. Contractor shall maintain a twenty-four (24) hour a day telephone number within Suffolk County for emergency traffic signal trouble calls. Contractor shall be responsible for informing the local Police Precinct and Suffolk County Department of Traffic Engineering, Traffic Signal Operations of emergency traffic signal troubles.

3.6 CONSTRUCTION SIGNS

A. Provide, maintain, move and remove reflectorized construction signs in accordance with the requirements of Federal MUTCD and NYSDOT supplements.

B. Paint supports and backs of sign panels with two coats of white paint.

C. Mount construction signs a minimum of 5 feet above the surface of the traveled way.

3.7 CONSTRUCTION BARRICADES

A. Provide, maintain, move and remove lighted construction barricades in accordance with the

requirements of Federal MUTCD and NYSDOT supplements.

B. Provide flashing barricade lights conforming to the requirements of Federal MUTCD and NYSDOT supplements.

C. Hours of operation for barricade lights shall be from dusk to dawn.

3.8 PAVEMENT DELINEATION

A. Provide pavement delineation in accordance with Federal MUTCD and NYSDOT supplements on any course of asphalt concrete upon which traffic will be maintained.

B. Apply pavement delineation before the end of the working day.

3.9 OPENING ROADWAY TO TRAFFIC PRIOR TO CONTRACT ACCEPTANCE

A. Maintain and protect traffic on any portion of pavement or structure ordered by the Owner, Owner's Representative, County, Town and/or Village or as shown in the Contract Documents to be opened to traffic prior to contract acceptance.

3.10 REMOVAL OF TRAFFIC CONTROL DEVICES

A. Promptly remove all delineators, signs, barricades and pavement workings when in the opinion of the Owner, Owner's Representative, County, Town and/or Village their presence constitutes a hazard or inconvenience to the traveling public.

B. Remove all remaining traffic control devices upon completion of the Work of this contract unless otherwise ordered by the Owner, Owner's Representative, County, Town and/or Village.

3.11 WATCHMEN SERVICE

A. If ordered by the Owner, Owner's Representative, County, Town and/or Village, Contractor shall provide watchmen service for the continuous patrol of the Contract site during non-working hours or whenever his operations are closed down. Watchmen service shall be provided from the commencement to the completion of actual construction.

B. Watchmen will be responsible for making sure that all temporary fences, signs, barricades, flares and markers are up and in good condition.

C. Watchmen shall maintain daily logs of their patrols. Copies of these logs shall be submitted weekly.

D. In the event that any unusual or emergency condition arises, the watchmen shall immediately notify the Contractor, the Owner's Representative and the appropriate regulatory or emergency agency for assistance.

E. Contractor may apply for suspension of the watchmen service following completion of the active construction but prior to the completion of the project (when punch list items remain).

3.12 MAINTENANCE OF TRAFFIC IN RIGHT-OF-WAYS

A. Contractor shall be required to limit his work schedule to specific times and seasonal periods as specified or as ordered by the roadway Owner. To ensure the orderly flow of travel on roadways where peak traffic is influenced by commuter traffic, Contractor shall proceed with the construction as specified in the Contract Documents. All equipment and stockpiled material shall then be removed from the site and the road opened to traffic for its full width prior to the end of the workday, unless otherwise directed by the roadway Owner and/or Owner's Representative.

B. Unless otherwise shown in the Contract Documents and/or as ordered by the roadway Owner and/or Owner's Representative, Contractor shall protect and maintain a minimum of one (1) lane of traffic in each direction at all times.

3.13 PAVEMENT STRIPING

A. Contractor is responsible for all temporary striping on County, Town and Village roadways where the existing striping has been obliterated by construction or has to be changed for construction. On County, Town and Village roads, temporary striping shall be placed immediately after completion of the temporary and/or base pavement.

B. Upon completion of the final pavement restoration on County, Town and Village roadways, the Contractor shall notify the County, Town and Village for restoration of all County, Town and Village roadway striping obliterated during the course of construction.

C. Contractor shall be responsible for all permanent restriping in County, Town and Village roads to the previously existing pattern and using the materials specified in the Contract Documents.

END OF SECTION 01526

SECTION 01570 – TEMPORARY CONTROLS

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contactor shall provide and maintain methods, equipment, and temporary construction as required to control environmental conditions at the Site and adjacent areas.
2. Maintain controls until final completion or if no longer required as determined by Owner and/or Owner's Representative.
3. Upon completion of the Work, remove temporary controls and restore Site to specified condition; if condition is not specified, restore Site to pre-construction condition.

1.2 NOISE CONTROL

A. General:

1. Contactor's vehicles and equipment shall minimize noise to greatest degree practicable.
2. Noise levels shall conform to Laws and Regulations, including OSHA requirements and local ordinances.
3. Noise levels shall not interfere with the public and work of Owner or others.

1.3 DUST CONTROL

A. Control objectionable dust caused by Contactor's operation of vehicles and equipment, clearing, or other actions. To minimize airborne dust, apply water or use other methods subject to acceptance of Owner and/or Owner's Representative and approval of authorities having jurisdiction.

1.4 PEST AND RODENT CONTROL

A. General:

1. Provide rodent and pest control as required to prevent infestation of the Site and storage areas.
2. Employ methods and use materials that do not adversely affect conditions at the Site or on adjoining properties.

1.5 WATER CONTROL

A. General:

1. Provide methods to control surface water and water from excavations and structures to prevent damage to the Work, the Site, and adjoining properties.
2. 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 to prevent erosion, damage, or nuisance.

B. Equipment and Facilities for Water Control: Provide, operate, and maintain equipment and facilities of adequate size to control surface water.

C. Discharge and Disposal: Dispose of drainage water in manner to prevent flooding, erosion, and other damage to any and all parts of the Site and adjoining areas, and that conforms to Laws and Regulations.

1.6 POLLUTION CONTROL

A. General:

1. Provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere caused by discharge of noxious substances from construction operations.
2. Equipment used during construction shall conform to federal, state, and local Laws and Regulations.

B. Spills and Contamination:

1. Provide equipment and personnel to perform emergency measures required to contain spillages, and to remove contaminated soils or liquids.
2. Excavate contaminated earth and provide for legal offsite transportation and disposal. Replace with suitable compacted fill and topsoil.

C. Protection of Surface Waters: Implement special measures to prevent harmful substances from entering surface waters. Prevent disposal of wastes, effluents, chemicals, or other such substances in or adjacent to surface waters and open drainage routes, in sanitary sewers, or in storm sewers.

D. Atmospheric Pollutants:

1. Provide systems for controlling atmospheric pollutants related to the Work.
2. Prevent toxic concentrations of chemicals.
3. Prevent harmful dispersal of pollutants into atmosphere.

E. Solid Waste:

1. Provide systems for controlling and managing solid waste related to the Work.
2. Prevent solid waste from becoming airborne, and from discharging to surface waters and drainage routes.
3. Properly handle and dispose of solid waste.

1.7 EROSION CONTROL

A. General:

1. Plan and execute construction and earthwork by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
2. Hold to a minimum the areas of bare soil exposed at one time.
3. Provide temporary control measures such as berms, dikes, and drains.
4. Construct fills and waste areas by selective placement to eliminate surface silts or clays that will erode.
5. Periodically inspect earthwork to detect evidence of the start of erosion; apply corrective measures as required to control erosion. Continue inspections and corrective measures until

permanent vegetation has been established

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01570

NO TEXT THIS PAGE

SECTION 01600 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products and special warranties.

B. Related Sections:

1. Division 01 Section "Substitution Procedures" for requests for substitutions.

1.3 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1.4 ACTION SUBMITTALS

A. Comply with requirements in Division 01 Section “Shop Drawing Procedures.” Show compliance with requirements.

1.5 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1. Each Contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
2. If a dispute arises between contractors over concurrently selectable but incompatible products, Owner’s Representative will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
2. Products shall not be delivered to Site until related Shop Drawings have been approved by Owner's Representative.
3. Make all arrangements for transportation, delivery and handling of equipment and materials required for completion of the Work.
4. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
5. Shipments of materials shall be delivered to the site only during regular working hours. Shipments shall be addressed and consigned to the proper party giving name of Project, street number and city. Shipments shall not be delivered to Owner unless directed by Owner's Representative.
6. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing. All shipments shall contain a parts list and manufacturer's part number in a plastic zippered envelope. Inform the Owner's Representative of all equipment deliveries under this Contract. 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.
7. Inspect products on delivery to determine:

    a. Compliance with the Contract Documents and reviewed submittals.
    b. Products are undamaged and properly protected.
    c. Quantities are correct.
    d. Containers and packages are intact, labels are legible.
    e. Products are properly protected and undamaged.

8. Do not deliver materials to job until they can be properly protected and until required storage facilities have been provided. Owner shall not provide storage in any building, structure or facility. Should the Owner agree to allow storage the security and responsibility of the stored item(s) lies solely with the Contractor. Any damage, theft, or other problem with any stored item is the solely the responsibility of the Contractor.
9. Provide equipment and personnel necessary to handle products by methods to prevent soiling or damage to products or packaging.
10. Provide additional protection during handling as necessary to prevent scraping, marring or otherwise damaging products or surrounding surfaces.
11. Handle products by methods to prevent bending or overstressing.
12. Lift heavy components only at designated lifting points.
13. 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

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Make every effort to minimize extended storage periods for materials and equipment at the Site by judiciously scheduling deliveries to coincide with construction needs. Do not store unnecessary materials or equipment at the Site and take care to prevent any structure from being loaded with a weight which will endanger its integrity or the safety of persons. All storage and methods of protection for material and equipment at the Site shall be subject to the prior approval of the Owner's Representative. Any costs associated with the storage and protection of materials and equipment shall be included in the lump sum bid and no additional payment will be made.
3. Store materials in a manner that will not endanger surrounding structures.
4. Materials shall not be placed within ten (10) feet of fire hydrants.
5. Avenues for personnel and vehicular movement, gutters, drainage channels and inlets shall be kept unobstructed at all times.
6. In general, minimum protection for all materials shall include storage above ground, under waterproof cover, with ventilation adequate to prevent condensation.
7. Storage of any mechanical or electrical equipment outdoors at any time is absolutely prohibited regardless of the protection furnished. Storage of mechanical and electrical equipment within structures at the Site owned by the Owner will not be permitted.
8. All mechanical and electrical equipment shall be coated, wrapped and otherwise protected from snow, rain, drippings of any sort, dust, dirt, condensed water vapor, etc. during shipment, storage, and subsequent to installation and until placed in service.
9. All equipment having moved parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the Owner, until such time as the equipment is to be installed.
10. Should storage of mechanical and electrical equipment become necessary before it can be stored at the Site, the Contractor shall provide storage in a weatherproof warehouse.
11. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
12. Comply with product manufacturer's written instructions for maintenance, temperature, humidity, ventilation, and weather-protection requirements for storage.
13. Protect stored products to prevent damage from moisture, rain, dirt, cold, sunlight, and other harmful influences and liquids from freezing.
14. All costs for equipment protection including warehousing or other work to meet the scheduled completion date shall be included in the Bid and no additional payment will be made.
15. If necessary to move stored materials and equipment during construction, Contractor shall move or cause to be moved materials and equipment without any additional compensation.

D. Material, Services, and Facilities

1. It is understood that except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all materials, labor, tools, equipment, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the work within the specified time.

2. Unless otherwise stated in the Proposal, on the plans, or in the Specifications, it will be understood that only articles or materials manufactured or produced in the United States will be used on the work.
3. After receipt of the Notice of Award, the Contractor shall furnish the Owner's Representative within ten (10) days the names and addresses of all companies from whom he proposes to purchase materials or manufactured products which are to be incorporated into the work. He shall also designate the location of plant or plants to be used for the mixing or batching of materials. The source of supply of each of the materials specified shall be approved by the Owner's Representative before delivery is started.
4. In those instances where the Owner's Representative deems it necessary to have physical inspections made of materials, products, sources of supply, or of mixing, batching, or manufacturing processes, the Contractor shall give the Owner's Representative not less than ten (10) working days notice plus travel time prior to all out-of-County inspections.
5. Only materials conforming to the requirements of these Specifications and approved by the Owner's Representative shall be used in the work. No material which, after approval, has in any way become unfit for use, shall be used in the work. Acceptance at any time of any material shall not be a bar to its future rejection if subsequently found to be defective or inferior in quality or uniformity in the materials specified. Any material may be rejected if, in the opinion of the Owner's Representative, service records indicate that it is unsound or otherwise unsatisfactory.
6. Manufacturer and/or supplier shall furnish with each delivery of material a sworn statement certifying that the products furnished meet all the requirements of the Specifications, that all the required tests were performed, and that the product meets or exceeds all specified test requirements. Contractor shall transmit these certified statements along with the original forms reporting results from any and al testing to the Owner's Representative within twenty- four (24) hours of delivery of materials.
7. Materials, supplies, or equipment to be incorporated into the work shall not be purchased by the Contractor or the Subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.
8. Manufactured articles, materials, and equipment shall be stored, applied, installed, connected, erected, used, cleaned, and conditioned as directed by the manufacturer, and as approved by the Owner's Representative.
9. Materials and equipment shall be so stored as to insure the preservation of their quality and fitness for the work. Stored materials and equipment to be incorporated in the work shall be located so as to facilitate prompt inspection.
10. Aggregate stockpiles shall be located at points approved by the Owner's Representative and so arranged that fine and coarse aggregates or coarse aggregates separated by specification requirements, do not become mixed.
11. Contractor shall provide either approved platforms or a prepared base satisfactory to the Owner's Representative; or at least six (6) inches of the base of the stockpile material shall be left undisturbed until the completion of pavement and structures.
12. Materials from different sources of supply shall not be stored in the same stockpile unless approved by the Owner's Representative.
13. Perishable materials shall be placed in waterproof buildings or otherwise protected from the elements.
14. Stored materials, even though approved before storage, may be subject to further inspection prior to their use in the work and shall meet the requirements of the Specifications at the time it is proposed to use them.
15. Pipe stored adjacent to the trench or on the contract site shall be stored according to the following requirements: (1) Pipe that is stock piled shall be properly checked and strapped

to the satisfaction of the Owner’s Representative in such a position until ready for use; (2) when pipe is stored singularly adjacent to or in the vicinity of the trench, each length of pipe shall be checked for defects prior to its installation.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.

1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
4. Where products are accompanied by the term "as selected," Owner shall make selection with assistance from the Owner’s Representative.
5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.

B. Product Selection Procedures:

1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Substitutions for Contractor's convenience will not be considered.
2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Substitutions for Contractor's convenience will not be considered.
3. Products:

    a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Substitutions for Contractor's convenience will not be considered**,** unless otherwise indicated.
    b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements.

4. Manufacturers:

    a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Substitutions for Contractor's convenience will not be considered, unless otherwise indicated.
    Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01600

SECTION 01651 - TRANSPORTATION AND HANDLING OF PRODUCTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. This Section includes the general requirements for transporting and handling of products.
2. Contractor shall make all arrangements for transporting, delivery, and handling of products required for prosecution and completion of the Work.
3. Move products stored, when necessary, without additional compensation or changes to the Contract Times.

1.2 PREPARATION FOR SHIPMENT

A. When practical, factory-assemble products. Match mark or tag separate parts and assemblies to facilitate field assembly. Cover machined and unpainted parts that may be damaged by the elements with strippable, protective coating.

B. Package products to facilitate handling and protect from damage during shipping, handling, and storage. Mark or tag outside of each package or crate to indicate its purchase order number, bill of lading number, contents by name, Owner's contract name and number, Contractor, equipment number, and approximate weight. Include complete packing lists and bills of materials with each shipment.

C. Protect products from exposure to the elements and keep thoroughly dry and dust free at all times. Protect painted surfaces against impact, abrasion, discoloration, or other damage. Lubricate bearings and other items requiring lubrication.

D. Advance Notice of Shipments:

1. Keep Owner's Representative informed of delivery of all products to be incorporated in the Work.

E. Do not have products shipped until:

1. Related Shop Drawings, Samples, and other submittals have been approved or accepted (as applicable) by Owner's Representative.
2. Related factory testing results, when required in individual Specification Sections, have been reviewed and accepted by Owner's Representative.
3. Required storage facilities have been provided.

1.3 DELIVERY

A. Scheduling and Timing of Deliveries:

1. Arrange deliveries of products in accordance with the accepted Progress Schedule and in ample time to facilitate inspection prior to installation.
2. Schedule deliveries to minimize space required for and duration of on-Site storage of products and equipment.
3. Coordinate deliveries to avoid conflicting with the Work and conditions at Site, and to accommodate the following:

    a. Work of other contractors, and Owner.
    b. Storage space limitations.
    c. Availability of equipment and personnel for handling products.
    d. Owner's use of premises.

4. Deliver products to the Site during regular working hours.

B. Deliveries:

1. Shipments shall be delivered with Contractor's name, Subcontractor's name (if applicable), Site name, Project name, and contract designation clearly marked.
2. Site may be listed as the "Ship To" or "Delivery" address; but Owner shall not be listed as recipient of shipment, unless otherwise directed in writing by Owner's Representative.
3. Provide Contractor's telephone number to shipper; do not provide Owner's telephone number.
4. Arrange for deliveries while Contractor's personnel are on-Site. Contractor shall receive and coordinate shipment upon delivery. Shipments delivered to the Site when Contractor is not present will be refused by Owner, and Contractor shall be responsible for delays and additional costs, if incurred.

C. Containers and Marking:

1. Have products delivered to Site in manufacturer's original, unopened, labeled containers.
2. Clearly mark partial deliveries of component parts of equipment to identify equipment, to allow easy accumulation of parts, and to facilitate assembly.

D. Immediately upon delivery, inspect shipment to verify that:

1. Products comply with the Contract Documents and approved or accepted (as applicable) submittals.
2. Quantities are correct.
3. Products are undamaged.
4. Containers and packages are intact and labels are legible.
5. Products are properly protected.

E. Promptly remove damaged products from the Site and expedite delivery of new, undamaged products, and remedy incomplete or lost products to provide that specified, to avoid delaying progress of the Work.

1.4 PRODUCT HANDLING

A. Provide equipment and personnel necessary to handle products, including those provided by Owner, by methods that prevent soiling or damaging products and 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 that prevent bending or overstressing.

D. Lift heavy components only at designated lifting points.

E. Handle products in safe manner and as recommended by manufacturer to prevent damage. Do not drop, roll, or skid products off delivery vehicles or at other times during handling. Hand-carry or use suitable materials handling equipment.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01651

NO TEXT THIS PAGE

SECTION 01661 – STORAGE AND PROTECTION OF PRODUCTS

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section includes general requirements for storing and protecting materials and equipment.

1.2 STORAGE

A. Store and protect materials and equipment in accordance with manufacturer's printed recommendations and the Contract Documents.

B. Contractor shall make all arrangements and provisions necessary for, and pay all costs for, storing materials and equipment. Excavated materials, construction equipment, and materials and equipment to be incorporated into the Work shall be placed to avoid injuring the Work and existing facilities and property, and so that free access is maintained at all times to all parts of the Work and to public utility installations in vicinity of the Work. Store materials and equipment neatly and compactly in locations that cause minimum inconvenience to Owner, other contractors, public travel, and owners, tenants, and occupants of adjoining property. Arrange storage in manner to provide easy access for inspection.

C. Store materials and equipment to become property of Owner to facilitate their inspection and ensure preservation of quality and fitness of the Work, including proper protection against damage by freezing, moisture, and high temperatures. Store in indoor, climate-controlled storage areas all materials and equipment subject to damage by moisture, humidity, heat, cold, and other elements, unless otherwise acceptable to Owner. When placing orders to Suppliers for equipment and controls containing computer chips, electronics, and solid-state devices, Contractor shall request, coordinate, and comply with specific temperature and humidity limitations on materials and equipment, including temperatures inside cabinets and components that are stored in warm temperatures.

D. Contractor shall be fully responsible for loss or damage (including theft) to stored materials and equipment.

E. Do not open manufacturer's containers until time of installation, unless recommended by the manufacturer or otherwise specified in the Contract Documents.

F. Do not store materials or equipment in structures being constructed unless approved by Owner's Representative in writing.

G. Do not use lawns or other private property for storage without written permission of the owner or other person in possession or control of such premises.

1.3 PROTECTION

A. Equipment shall be boxed, crated, or otherwise completely enclosed and protected during shipping, handling, and storage, in accordance with Section 01651, Transportation and Handling of Products.

B. Store all materials and equipment off the ground or floor on raised supports such as skids or pallets.

C. Protect painted surfaces against impact, abrasion, discoloration, and other damage. Painted equipment surfaces that are damaged or marred shall be repainted in their entirety in accordance with equipment manufacturer and paint manufacturer requirements, to the satisfaction of Owner's Representative.

D. Protect electrical equipment, controls, and instrumentation against moisture, water damage, heat, cold, and dust. Space heaters provided in equipment shall be connected and operating at all times until equipment is placed in operation and permanently connected.

1.4 UNCOVERED STORAGE

A. The following types of materials may be stored outdoors without cover on supports so there is no contact with the ground:

1. Reinforcing steel.
2. Structural steel.
3. Piping, except polyvinyl chloride (PVC) or chlorinated PVC (CPVC) pipe.
4. Precast concrete materials.
5. Castings.
6. Handrails and railings.
7 Grating.
8. Checker plate.
9. Metal stairs.
10. Metal access hatches.
11. Fiberglass products.
12. Rigid electrical conduit.

1.5 COVERED STORAGE

A. The following materials and equipment may be stored outdoors on supports and completely covered with covering impervious to water:

1. Rough lumber.
2. PVC and CPVC pipe.
3. Filter media.
4. Masonry units.
5. Grout and mortar materials.

B. Tie down covers with rope, and slope covering to prevent accumulation of water.

C. Store loose granular materials, with covering impervious to water, in well-drained area or on solid surfaces to prevent mixing with foreign matter.

1.6 FULLY PROTECTED STORAGE

A. Store all material and equipment not named in Articles 1.4 and 1.5 of this Section on supports in buildings or trailers that have concrete or wooden flooring, roof, and fully closed walls on all sides. Covering with visquine plastic sheeting or similar material in space without floor, roof, and walls is not acceptable. Comply with the following:

1. Provide heated storage for materials and equipment that could be damaged by low temperatures or freezing.
2. Provide air-conditioned storage for materials and equipment that could be damaged by high temperatures.
3. Protect mechanical and electrical equipment from being contaminated by dust, dirt, and moisture.
4. Maintain humidity at levels recommended by manufacturers for electrical and electronic equipment.

1.7 HAZARDOUS PRODUCTS

A. Prevent contamination of personnel, storage area, and the Site. Comply with Laws and Regulations, and manufacturer's instructions.

1.8 MAINTENANCE OF STORAGE

A. On scheduled basis, periodically inspect stored materials and equipment to ensure that:

1. State of storage facilities is adequate to provide required conditions.
2. Required environmental conditions are maintained on continuing basis.
3. Materials and equipment exposed to elements are not adversely affected.

B. Mechanical and electrical equipment requiring long-term storage shall have complete manufacturer's instructions for servicing each item, with notice of enclosed instructions shown on exterior of container or package.

1. Comply with manufacturer's instructions on scheduled basis.
2. Space heaters that are part of electrical equipment shall be connected and operated continuously until equipment is placed in service and permanently connected.

1.9 MICROPROCESSORS, PANELS, AND INSTRUMENTATION STORAGE

A. Store panels, microprocessor-based equipment, electronics, and other devices subject to damage or decreased useful life because of temperatures below 40 degrees F or above 100 degrees F, relative humidity above 90 percent, or exposure to rain or exposure to blowing dust in climate-controlled storage space.

B. Requirements:

1. Storage shall be indoors and climate controlled.
2. Owner and Owner's Representative have the right to inspect materials and equipment during normal working hours.
3. Placed inside each panel or device a desiccant, volatile corrosion inhibitor blocks (VCI), moisture indicator, and maximum-minimum indicating thermometer.
4. Check panels and equipment at least once per month. Replace desiccant, VCI, and moisture indicator as often as required, or every six months, whichever occurs first.
5. Certified record of daily maximum and minimum temperature and humidity in storage facility shall be available for inspection by Owner and Owner's Representative. Certified record of monthly inspection, noting maximum and minimum temperature for month, condition of desiccant, VCI, and moisture indicator, shall be available for inspection by Owner and

Owner's Representative.

C. Costs for storing climate-sensitive materials and equipment shall be paid by Contractor. Replace panels and devices damaged during storage, or for which storage temperatures or humidity range has been exceeded, at no additional cost to Owner. Delays resulting from such replacement are causes within Contractor's control.

D. Do not ship panels and equipment to the Site until conditions at the Site are suitable for installation, including slabs and floors, walls, roofs, and environmental controls. Failure to have the Site ready for installation shall not relieve Contractor from complying with the Contract Documents.

1.10 RECORDS

A. Keep up-to-date account of materials and equipment in storage to facilitate preparation of Applications for Payment, if the Contract Documents provide for payment for materials and equipment not incorporated in the Work but delivered and suitably stored at the Site or at another location agreed to in writing.

PART 2 – PRODUCTS (NOT USED)

PART 3 – EXECUTION (NOT USED)

END OF SECTION 01661

SECTION 01710 – RECORD DRAWINGS AND CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for record drawings contract closeout, including, but not limited to, the following:

1. Progress record drawings.
2. Project record drawings.
3. Substantial completion procedures.
4. Final completion procedures.
5. Warranties.
6. Final cleaning.

B. Related Sections:

1. Drawings and general provisions of the Contract, including General and Supplementary Conditions apply to this Section.
2. Division 01 Section "Photographic Documentation" for submitting final completion construction photographic documentation.
3. Division 01 Section "Temporary Facilities and Controls" for construction waste disposal.
4. Division 01 Section “Cleaning” for progress cleaning of project site.

1.3 RECORD DRAWINGS

A. Record Prints: Maintain one (1) set of blue or black-line white prints of the contract drawings and shop drawings on-site in Contractor’s field trailer.

1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is installer, Subcontractor, or similar entity, to prepare the marked-up record prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data shall be updated on a monthly basis. Record and check the mark-up before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

    a. Dimensional changes to drawings.
    b. Locations and depths of underground utilities.
    c. Revisions to routing of piping and conduits.
    d. Actual equipment locations.
    e. Changes made by Change Order.
    f. Changes made following Owner’s Representative's written orders.
    g. Details not on the original Contract Drawings.
    h. Field records for variable and concealed conditions.
    i. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
7. Maintain in the Contractor's field office in a clean, dry and legible condition complete sets of the following: Contract drawings, specifications, addenda, approved shop drawings, samples, change orders, modifications to contract, test records, field/change orders, and all other documents pertinent to the Contractor's work.
8. Provide files and racks for proper storage and easy access. File in accordance with filing format of Construction Specification Institute (CSI) unless otherwise approved by Owner’s Representative.

    a. Make documents available at all times for inspection by the Owner and/or Owner’s Representative.
    b. Record documents shall not be used for any other purpose and shall not be removed from the office without the Owner’s Representative approval.

9. Contractor shall submit on a monthly basis two (2) prints of all Record Plans developed or added to so as to reflect that month's construction activity and progress. This submittal by the Contractor shall accompany his monthly requisition for payment and the submittal's accuracy and adequacy must be approved as a prerequisite to processing said requisition. Substantial completion payment or final payment to the Contractor will not be processed until the Record Plans are approved by the Owner.

10. All Record Plans shall have the following data as applicable contained thereon:

    a. The notation "Record Plan" in prominent lettering.
    b. Description of material.
    c. Explanatory notes qualifying the information contained on the Record Plan.
    d. Contractor's name, address, and phone number.

11. Contractor shall be responsible for all costs associated with reproducing Record Plans if they are lost, damaged, or otherwise marred at any time prior to final acceptance of the entire set of Record Plans.

B. Record AutoCAD Drawings: Immediately before inspection for Substantial Completion, review marked-up Record Prints with Owner's Representative. Prepare a full set of corrected AutoCAD Drawings of the Contract Drawings, as follows:

1. Format: Same AutoCAD program, version, and operating system as the original Contract Drawings.
2. Incorporate changes and additional information previously marked on Record Prints. Delete, redraw, and add details and notations where applicable.
3. Refer instances of uncertainty to Owner's Representative for resolution.
4. Owner's Representative will furnish Contractor one (1) set of AutoCAD Drawings of the Contract Drawings for use in recording information. Owner's Representative makes no representations as to the accuracy or completeness of AutoCAD Drawings as they relate to the Contract Drawings.

C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Owner's Representative determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.

1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
2. Consult Owner's Representative for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

D. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in two (2)-inch high printed letters, in a prominent location.

1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets. Prior to final payment, provide up to five (5) paper copies of all record drawings once record drawings have been approved.
2. Record Transparencies: Organize into unbound sets matching Record Prints. Place transparencies in durable tube-type drawing containers with end caps. Mark end cap of each container with identification. If container does not include a complete set, identify Drawings included.
3. Record AutoCAD Drawings: Organize AutoCAD information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each AutoCAD file.
4. Identification: As follows:

    a. Project name.
    b. Date.
    c. Designation "PROJECT RECORD DRAWINGS."
    d. Name of Owner's Representative.
    e. Name of Contractor.

5. The additional cost for preparation of record plans resulting from an approved Change Order is considered included in the cost of the Change Order.

E. Project record drawings must be signed and sealed by a licensed and registered New York State Land Surveyor or licensed and registered New York State Professional Engineer and must supply a suitable permanent record of the exact location and elevation of sewer lines, structures, stubs, house connections, wyes and appurtenances,

F. Project record drawings shall be prepared in digital (AutoCAD) format. Plans must be in the following coordinate systems: Horizontal Coordinate System - NAD 1983, State Plane, New York, Long Island Zone, US Survey Feet; Vertical Datum - North American Vertical Datum 1988. All sheets of the as-built drawings shall indicate the Horizontal Coordinate System and Vertical Datum System. Elevations of points of control in differing datum must note the original datum and its corresponding elevation and 1988 (NAVD) datum and elevation on plans.

G. Project record drawings must include, but not be limited to, site plan, operation and maintenance manuals, schematics and elementary drawings of electrical, mechanical and process systems, where applicable. Drawings must be signed and sealed by New York State Licensed and Registered Professional Engineer and prepared in digital (AutoCAD) format. Plans must be in the following coordinate systems: Horizontal Coordinate System - NAD 1983, State Plane, New York, Long Island Zone, US Survey Feet; Vertical Datum: North American Vertical Datum 1988. All sheets of the as-built drawings shall indicate the Horizontal Coordinate System and Vertical Datum System. Elevations of points of control in differing datum must note the original datum and its corresponding elevation and 1988 (NAVD) datum and elevation on plans.

1.4 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Include the following information at the top of each page:

   a. Project name.
   b. Date.
   c. Name of Owner’s Representative.
   d. Name of Contractor.
   e. Page number.

2. Submit list of incomplete items in the following format:

   a. Up to three (3) paper copies of product schedule or list, unless otherwise indicated. Owner’s Representative will return one (1) copy.

1.5 SUBSTANTIAL COMPLETION

A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete with request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities.
5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
6. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
8. Complete startup testing of systems.
9. Submit test/adjust/balance records.
10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
11. Advise Owner of changeover in heat and other utilities.
12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
13. Complete final cleaning requirements, including touchup painting.
14. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. Within ten (10) days after receipt of such notice, Owner’s Representative shall either proceed with inspection or notify Contractor of unfulfilled requirements. Owner and Owner’s Representative shall generate punch list and any outstanding items preventing substantial completion for transmittal to Contractor.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for final completion.

C. Follow-up Inspection:

1. At time of completion of guarantee period, Owner's Representative will make arrangements with Contractor for follow-up inspection and send written notice to said parties to inform them of date and time of inspection. After inspection, Owner's Representative will inform the Contractor of any corrections required.

D. Spare Parts and Special Tools: Contractor shall submit a list of spare parts and special tools for each piece of equipment installed for this Project to be turned over to the Owner to the Owner’s Representative. The list shall include all spare parts and special tools mentioned in Contract Documents and those included in the approved O&M Manuals. Each list shall include the name of the part or tool along with the corresponding manufacturer’s reference number shown in the parts list of the O&M Manuals. Each and every spare part, including those in any kit to be turned over, shall be marked with the corresponding spar part number shown on the list. Each kit shall also be marked with the corresponding kit number in addition to each individual part

number in the kit. Any discrepancy found at the time of the turnover to the Owner shall be reason to reject the parts, either partial or in total by the Owner at the Owner's discretion. After two (2) attempts by Contractor to turnover the spare parts without achieving compliance, the Contractor will be back charged for the time and effort of the Owner's Representative to participate in the review of any and all lists for the parts and tools as well as the time and effort to participate in the turnovers. All spare parts and tools shall be delivered by Contractor to a location designated by Owner once the spare parts and special tools have been accepted, in writing, by Owner.

1.6 FINAL COMPLETION

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit certified copy of Owner's Representative's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Owner's Representative. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
2. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
3. Train Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems in accordance with Section 01821, Instruction of Operations and Maintenance Personnel, where applicable.

B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Owner's Representative will either proceed with inspection or notify Contractor of unfulfilled requirements.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

C. When in the opinion of the Owner's Representative the Contractor has fully performed the Work under the Contract, the Owner's Representative will recommend to the Owner the acceptance of the Work so completed. Owner's Representative's recommendation will indicate the value of the work performed and materials and equipment furnished, and exact aggregate amount of the compensation to which the Contractor will become entitled under the terms of the Contract.

1.7 WARRANTIES

A. Warranties shall be provided for all equipment specified in Divisions 02 to 15.

Contractor shall provide a Warranty Certificate from the manufacturer typed on company letterhead and signed by an authorized officer of the manufacturer. The certificate shall be witnessed by a notary public in the state in which the company headquarters is located. The Warranty Certificate shall be submitted, verbatim and without exception, as follows:

"(Name of manufacturer) guarantees all components of the system to be free from defects in design, materials and workmanship for a period of _____ (___) years commencing on the date

the system was permanently placed on-line, and the mechanical equipment functions without flaw.

During the guarantee period, if any part or equipment component is defective or fails to perform when operating at design conditions and if the equipment has been installed and is being operated and maintained in accordance with the written instructions we provided, then we shall repair or exchange such defective part (s).

However, if the (Name of Manufacturer) fails to repair or exchange such defective part(s) within 30 calendar days ("grace period") of receiving either notification of warranty repair/replacement by the Owner or delivery of the defective part to Manufacturer's designated service center, if required, then the guarantee period shall be extended by a period of time equal to the total period of time needed to satisfy the warranty repair or replacement delivered to the site, including the 30 day grace period. The extended guarantee period shall pertain to all of the Manufacturer's equipment placed "out of service" due to the defective part/component. This provision will hold true regardless of the number of times covered equipment requires warranty repair during the warranty period, original or extended.
The replacement or repair of parts normally consumed in service shall include lubrication. Only lubrication shall be considered as part of routine maintenance and up keep and shall not be considered eligible for exchange free of charge under this Warranty.

Agreed upon this _____ day
(date)
by _____ of
(name of authorized agent)
_____, who,
(name of manufacturer)
by signing this document, affirms that he/she is legally authorized to submit this warranty on behalf of the Manufacturer.

_____ _____
AUTHORIZED SIGNATURE DATE

_____
NOTARY"

B. Submittal Time: Submit written warranties on request of Owner's Representative for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated. Original warranty documentation shall be submitted with copies in each O&M manual. Original warranty submittals shall have the beginning and end date of each warranty clearly indicated on the warranty.

C. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor. Occupancy or use of any portion of the Work by Owner before final completion and written acceptance shall not be construed as evidence of final acceptance of the Work.

D. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch paper.
2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
4. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.

E. Provide additional copies of each warranty to include in operation and maintenance manuals.

F. Related Damages and Losses: When correcting warranted work that has failed, removal and replace other work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted work.

G. Reinstatement of Warranty: When work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation as determined by Owner's Representative.

H. Replacement Cost: Upon determination that work covered by a warranty has failed, replace or rebuild the work to an acceptable condition complying with requirements of Contract Documents. The Contractor is responsible for the cost of replacing or rebuilding defective work regardless of whether the Owner has benefited from use of the work through a portion of its anticipated useful service life.

I. Owner's Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligations, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

J. Rejection of Warranties: Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the contract Documents.

K. Owner reserves the right to refuse to accept work for the Project where a special warranty, certification, or similar commitment is required on such work or part of the work, until evidence is presented that entities required to countersign such commitments have done so.

L. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product warranties do not relieve the Contractor of the warranty on the work that incorporates the products, nor does it relieve suppliers, manufacturers and subcontractors required to countersign special warranties with the Contractor.

M. Unless more stringent requirements are specified in the various specification Sections of Divisions 02 to 15 and the General and Supplementary Conditions, all warranties shall be for a minimum of one (1) year.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

B. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations. Contractor shall maintain cleaning until Project is accepted by the Owner.

C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

END OF SECTION 01710

NO TEXT THIS PAGE

SECTION 01723 – CUTTING AND PATCHING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Contractor shall perform cutting and coring, and rough and finish patching of holes and openings in existing or new construction, as required.

B. Cutting, coring, and rough patching shall be performed by the subcontractor requiring the opening. Finish patching shall be responsibility of the Contractor and shall be performed by trade associated with application of the particular finish.

D. Provide cutting, coring, fitting and patching, including attendant excavation and backfill, required to complete the Work, and to:

1. remove and replace defective Work;
2. remove samples of installed Work as specified or required for testing;
3. remove construction required to provide for specified alterations or addition to existing or new work;
4. uncover Work for Owner's Representative's observation of covered Work or observation by authorities having jurisdiction;
5. connect to completed Work not performed in proper sequence;
6. remove or relocate existing utilities and pipes that obstruct the Work in locations where connections must be made;
7. make connections or alterations to existing or new facilities.

E. Structural Elements: Do not cut or patch structural elements in manner that would change structural element's load-carrying capacity as load deflection ratio.

F. Operating Elements: Do not cut or patch operating elements in manner that would reduce their capacity to perform as intended. Do not cut or patch operating elements or related components in manner that would increase maintenance requirements or decrease operational life or safety.

1.2 SUBMITTALS

A. Action Submittals: Submit the following:

1. Cutting and Patching Request:

a. Submit written request to Owner's Representative well in advance of executing cutting or alteration affecting:

1) Design function or intent of the Project.
2) Work of Owner or other contractors.
3) Structural value or integrity of an element of the Project.
4) Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.

5) Efficiency, operational life, maintenance, or safety of operational elements.
6) Visual qualities of sight-exposed elements.

b. Request shall include:

1) Identification of Project and contract name and number.
2) Description of affected Work of Contractor and work of others.
3) Necessity for cutting.
4) Effect on work of Owner or other contractors, or on structural or weatherproof integrity of Project.
5) Description of proposed Work, describing: scope of cutting and patching; trades who will be executing the Work; products proposed to be used; extent of refinishing; schedule of operations; alternatives to cutting and patching, if any.
7) Designation of party responsible for cost of cutting and patching, when applicable.
8) Written permission of other contractors whose work will be affected.

2. Should conditions of Work, or schedule, indicate a change of materials or methods, submit written recommendation to Owner's Representative including:

a. Conditions indicating change.
b. Recommendations for alternative materials or methods.
c. Submittals as required for substitutions.

B. Informational Submittals: Submit the following:

1. Submit written notice designating time Work will be uncovered, to provide for observation. Do not begin cutting or patching operations until accepted by Owner's Representative.
2. X-ray Investigations:

a. Proposed method of investigation.
b. Report of X-ray evaluation of floors and walls to be cut or core-drilled.

C. Conform to submittal requirements in Specifications for application and installation of materials used for patching.

1.4 WARRANTY

A. Replace, patch, and repair materials and surfaces cut or damaged during cutting and patching operations, by methods and with materials in manner that does not void required or existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Materials:

1. Use materials in conformance with the Contract Documents.
2. If not shown or indicated in the Contract Documents, use materials and products that are identical to existing materials and products affected by cutting and patching Work.

3. For exposed surfaces, use materials that visually match existing adjacent surfaces to fullest extent possible. If identical materials are unavailable or cannot be used, use materials whose installed performance will equal or surpass that of existing materials.

PART 3 - EXECUTION

3.1 GENERAL

A. Perform cutting and coring in such manner that limits extent of patching.

B. Core drill holes to be cut through concrete and masonry walls, slabs, or arches, unless otherwise accepted by Owner's Representative in writing.

C. Provide seventy-two (72) hours advance notice of cutting or coring through existing concrete or masonry. Owner shall be notified in writing and requested to inspect the location with Contractor to determine if there are any known or identifiable embedded conduits or other items that could adversely affect Owner's operation if damaged by cutting/coring activities. If such items are identified and cannot be de-energized and/or abandoned by Owner, then Contractor shall make adjustment to a nearby location at no additional cost to Owner.

3.2 INSPECTION

A. Examine surfaces to be cut or patched and conditions under which cutting or patching are to be performed before starting cutting or patching Work.

B. Report unsatisfactory or questionable conditions to Owner's Representative in writing. Do not proceed with the Work until unsatisfactory conditions are corrected.

C. In advance of Work that includes cutting into existing floor, slabs, and walls, use X-ray or other non-destructive methods accepted by Owner's Representative to determine location of reinforcing steel, electrical conduits, and other items embedded in floors or walls. Provide to Owner's Representative written report of findings of evaluation. Perform X-ray investigation sufficiently in advance of cutting Work to allow time to identify and implement alternatives if changes to the Work are necessary because of conduit or other features in floor or wall.

3.3 PREPARATION

A. Provide temporary support as required to maintain structural integrity of Project, to protect adjacent Work from damage during cutting, and to support the Work to be cut.

B. Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that will be exposed during cutting and patching operations.

1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
2. Do not cut existing pipe, conduit, ductwork, or other utilities serving facilities scheduled to be removed or relocated until provisions have been made to bypass them.

3.4 CORING

A. Perform coring with non-impact rotary tool using diamond core drills. Size holes to accommodate pipe, conduit, sleeves, equipment or mechanical seals, as required.

B. Protect existing equipment, utilities and adjacent areas from water and other damage covered by drilling operations.

C. Vacuum or otherwise remove slurry or tailings from the Work area following drilling.

D. Do not core-drill through electrical conduit or other utility lines embedded in walls or floors without approval of Owner's Representative. To extent possible, avoid cutting reinforcing steel in floors and walls. After core-drilling, coat exposed concrete and steel with Sikagard 62 or approved equal, before installing the utility or equipment through the penetration.

3.5 CUTTING

A. Cut existing construction using methods least likely to damage elements retained or adjoining construction, and that will provide proper surfaces to receive installation or repair.

1. In general, use hand or small power tools designed for sawing or grinding, not hammering and chopping.
2. Cut through concrete and masonry using concrete wall saw with diamond saw blades.

a. Provide for control, on both sides of walls, of slurry generated by sawing.

B. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Provide temporary covering over openings where not in use.

C. To avoid marring existing finished surfaces, cut or drill from exposed or finished side into concealed side.

D. Provide adequate bracing of area to be cut prior to start of cutting.

E. Provide equipment of adequate size to remove cut panel.

3.6 PATCHING

A. Patch construction by filling, repairing, refinishing, closing-up and similar operations following performance of other Work. Patch with durable seams that are as inconspicuous as possible. Provide materials and comply with installation requirements specified, in the Specifications.

B. Where feasible, test patched areas to demonstrate integrity of installation.

C. Fit Work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

D. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in manner that eliminates evidence of patching and refinishing.

1. For continuous surfaces, refinish to nearest intersection.

2. For an assembly, refinish entire unit.

E. Patch, repair or rehang existing ceilings as necessary to provide an even-plane surface of uniform appearance.

3.7 CLEANING

A. Clean areas and spaces where cutting, coring and patching are performed. Clean piping, conduit, or similar constructions before applying paint or other finishing materials. Restore damaged coverings of pipe and other utilities to original condition.

END OF SECTION 01723

NO TEXT THIS PAGE

SECTION 01740 - CLEANING

PART 1 – GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall execute cleaning during the Work, at completion of the Work, and as required by the General Conditions.
2. Maintain in a clean manner the Site, the Work, and areas adjacent to or affected by the Work.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. NFPA 241, Standard for Safeguarding Construction, Alteration, and Demolition Operations.

1.3 PROGRESS CLEANING

A. General: Clean the Site, work areas, and other areas occupied by Contractor at least weekly. Dispose of materials in accordance with the General Conditions and the following:

1. Comply with NFPA 241 (latest edition) for removal of combustible waste materials and debris.
2. Do not hold non-combustible materials at the Site more than three (3) days if the temperature is expected to rise above 80 degrees F. When temperature is less than 80 degrees F, dispose of non-combustible materials within seven days of their generation.
3. Provide suitable containers for storage of waste materials and debris.
4. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately.

B. Owner's Right to Clean: Should the Contractor fail, refuse or neglect to remove rubbish and waste materials and temporary work or clean the contract area as required herein, then the Owner may without obligation to do so, remove and dispose of the said rubbish, waste materials and temporary work, clean the contract area and deduct the cost thereof from any money due, or to become due, the Contractor under this Contract.

C. Site:

1. Keep outdoor, dust-generating areas wetted down or otherwise control dust emissions.
2. At least weekly, brush-sweep roadways and paved areas at the Site that are used by construction vehicles or otherwise affected by the Work.

D. Work Areas:

1. Clean areas where Work is in progress to level of cleanliness necessary for proper execution of the Work.
2. Remove liquid spills promptly and immediately report spills to Owner, Owner’s Representative, and authorities having jurisdiction.
3. Where dust would impair proper execution of the Work, broom-clean or vacuum entire area of Work, as appropriate.

4. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

E. Installed Work: Keep installed Work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning agents and methods specifically recommended. If manufacturer does not recommend specific cleaning agents or methods, use cleaning agents and methods that are not hazardous to health or property and that will not damage exposed surfaces.

F. Exposed Surfaces: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration until Substantial Completion.

G. Cutting and Patching:

1. Clean areas and spaces where cutting and patching are performed. Completely remove paint, mortar, oils, putty, and similar materials.
2. Thoroughly clean piping, conduit, and similar features before applying paint or other finishing materials. Restore damaged pipe covering to its original condition.

H. Waste Disposal:

1. Properly dispose of waste materials, surplus materials, debris and rubbish off the Site.
2. Do not burn or bury rubbish and waste materials at the Site.
3. Do not discharge volatile or hazardous substances, such as mineral spirits, oil, or paint thinner, into storm sewers or sanitary sewers.
4. Do not discharge wastes into surface waters or drainage routes.
5. Contractor shall be solely responsible for complying with federal, state, and local Laws and Regulations regarding disposal of waste.

I. During handling and installation of materials and equipment, clean and protect construction in progress and adjoining materials and equipment already in place. Apply protective covering where required for protection from damage or deterioration, until Substantial Completion.

J. Clean completed construction as frequently as necessary throughout the construction period.

K. All Field Offices shall be cleaned at a minimum of bi-weekly. Cleaning shall include removal of trash and garbage, vacuuming of carpeted surfaces and mopping of other floor surfaces, dusting and washing of sanitary facilities as well as other surfaces and office items, once monthly cleaning of interior and exterior windows and ventilation and heating equipment (including ductwork interiors), as directed. All costs shall be included in Contractor's Bid.

1.4 CLOSEOUT CLEANING

A. Complete the following prior to requesting inspection for Substantial Completion:

1. Clean and remove from the Site rubbish, waste material, debris, and other foreign substances.
2. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
3. Hose-clean sidewalks and loading areas.
4. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
5. Leave surface waterways, drainage routes, and gutters open and clean.

6. Repair pavement, roads, sod, and all other areas affected by construction operations and restore them to specified condition; if condition is not specified, restore to original condition.
7. Clean exposed exterior and interior hard-surfaced finishes to dirt-free condition.
9. Remove debris from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.
10. In unoccupied spaces, sweep concrete floors broom-clean.
11. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
12. Remove non-permanent tags and labels.
13. Touch up and otherwise repair and restore chipped, scratched, dented or otherwise marred surfaces to specified finish and match adjacent surfaces.
    a. Do not paint over "UL" or similar labels, including mechanical and electrical nameplates.
14. Wipe surfaces of mechanical and electrical equipment, and similar equipment. Remove excess lubrication, paint, and mortar droppings, and other foreign substances.
15. Clean plumbing fixtures to sanitary condition, free of stains, including stains resulting from water exposure.
16. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
17. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace temporary lamps provided in permanent fixtures. Replace existing light fixture components that are burned out or noticeably dimmed from use during the Work. Replace defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
18. Leave the Site clean, and in neat, orderly condition, satisfactory to Owner and Owner's Representative.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01740

NO TEXT THIS PAGE

SECTION 02240 – SEDIMENT AND EROSION CONTROL PLAN

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Contractor shall assume responsibility for the control of soil erosion and water pollution from construction activities in accordance with federal, state and local regulations and in accordance with the Plans and Specifications and as directed by the Owner's Representative.

B. Recommended sediment and erosion control measures are shown on the Contract Documents. Contractor is responsible to comply with all applicable regulations.

1.2 RELATED WORK

A. General Conditions.

1.3 SUBMITTALS

A. Contractor shall submit a sediment and erosion control plan in accordance with the New York State Standards and Specifications for Urban Erosion and Sediment Control Manual, latest edition, for review by the Owner's Representative prior to commencing construction activities. A separate coordinated construction operation and sequence plan and dewatering and bypass plan shall be included as part of the sediment and erosion control plan submittal. The construction operation and sequence plan shall identify locations and timing for dewatering and bypass and installation of sediment and erosion control measures.

PART 2 - PRODUCTS – (NOT USED)

PART 3 - EXECUTION

3.1 INSTALLATION

A. Contractor shall install silt fences, hay bales, mulch or other approved methods of sediment and erosion control during construction activities in accordance with installation procedures of the New York State Standards and Specifications for Urban Erosion and Sediment Control Manual, latest edition and as shown on the Drawings or as directed by the Owner's Representative. Location of sediment and erosion control measures shall be coordinated with the approved construction operation and sequence plan and shall protect the water quality of the surface waters including streams, pond, and their receiving waters at all times.

B. Contractor shall take necessary measures to maintain dust. Construction vehicles shall be cleaned, as necessary, prior to using public streets.

C. Any changes to the sediment and erosion control plan shall require the submission of a revised sediment and erosion control plan to the Owner's Representative. The revised plans shall be in accordance with the New York State Standards and Specifications for Urban Erosion and Sediment Control Manual, latest edition.

D. Contractor shall be responsible obtaining all required permits. Discharge of water during bypass

and dewatering operations shall meet any water quality requirements of the New York State Department of Environmental Conservation.

E. All excess excavated material, except for topsoil, shall be removed from the site by the Contractor in accordance with the Contract Documents. Topsoil in excess of quantity required for the finished Project, shall remain property of Owner.

F. All utilities and catch basin inlets must be protected prior to start of construction. Protection of all utilities and catch basin inlets must be maintained throughout the life of the Project.

G. All sediment and erosion control practices shall be left in place and maintained; including silt and sediment removal, until construction is completed, area is stabilized and as directed by the Owner's Representative.

H. All bypass and dewatering operations must discharge directly into a sediment filter area. Sediment filters shall be installed in accordance with the Contract Documents and the details of design and construction shall be prepared and submitted by the Contractor to the Owner's Representative for review and approval.

END OF SECTION 02240

SECTION 02250 - EXCAVATION SUPPORT AND PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes temporary excavation support and protection systems.

B. Related Sections:

1. Section 02315, Excavation and Backfill.

C. Shoring shall be used as required for the safety of employees exposed to the hazard of falling or sliding material from any trench excavation or where protection of adjacent structures and utilities is required in accordance with the Specifications of this Section.

D. All excavations must be shored with the minimal protection of sheeting as listed in the OSHA regulations 29 CFR Part 1926 (Safety and Health Regulations for Construction), Subpart P, - "Excavations, Trenching, and Shoring".

E. Shoring of excavations shall be provided by the use of sheeting boxes, wood sheeting and bracing, steel sheeting and bracing, or other methods that are capable of providing adequate safety and support for excavations as specified herein.

F. Contractor shall be responsible at all times for carrying out all excavation operations in a safe and prudent manner so that the workmen and the public will be protected from any hazard.

G. The type of sheeting used is at the option of the Contractor except where otherwise shown, noted or specified in the Contract Documents.

H. Contractor shall install stabilization fabric in those areas where bog and/or meadow mat is encountered or where directed by the Owner’s Representative.

1.3 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, monitor, and maintain excavation support and protection system capable of supporting excavation sidewalls and of resisting soil and hydrostatic pressure and superimposed and construction loads.

1. Design excavation support and protection system, including comprehensive engineering analysis by a New York State licensed and registered professional engineer, using performance requirements and design criteria indicated.
2. Prevent surface water from entering excavations by grading, dikes, or other means.
3. Install excavation support and protection systems without damaging existing buildings,

structures, and site improvements adjacent to excavation.
4. Monitor vibrations, settlements, and movements.
5. Comply with all OSHA, confined space and all related regulations regarding excavation protection.

1.4 SUBMITTALS

A. Delegated-Design Submittal: For excavation support and protection system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the licensed and registered New York State professional engineer responsible for their preparation.

B. Other Informational Submittals:

1. Photographs or Videotape: Show existing conditions of adjacent construction and site improvements that might be misconstrued as damage caused by the absence of, the installation of, or the performance of excavation support and protection systems. Submit before Work begins.

2. Record Drawings: Identifying and locating capped utilities and other subsurface structural, electrical, or mechanical conditions.

1.5 QUALITY ASSURANCE

A. Pre-Installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to excavation support and protection system including, but not limited to, the following:

a. Geotechnical report.
b. Existing utilities and subsurface conditions.
c. Proposed excavations.
d. Proposed equipment.
e. Monitoring of excavation support and protection system.
f. Working area location and stability.
g. Coordination with waterproofing.
h. Abandonment or removal of excavation support and protection system.
i. Dewatering.

B. Adequate sheeting and bracing shall be placed to protect personnel working in the excavation in accordance with applicable requirements. Contractor will, in all instances, be held responsible for the adequacy of the sheeting.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Owner, Owner’s Representative and Owning Utility no fewer than three (3) days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Owner, Owner’s Representative and

Owning Utility written permission.

B. Project-Site Information:

1. Limited site soil boring data, samples and soil reports are available for inspection and are for informational purposes only. Any opinions expressed in these reports are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner shall not be responsible for interpretations or conclusions drawn from this data. Bidders must make their own interpretation of subsurface conditions that may affect methods or the cost of construction of the Work.
2. Contractor shall satisfy itself by actual examination of the site of the Work, as no claim shall be made by the Contractor for additional compensation by reasons of the fact that existing conditions are other than as shown of the Contract Documents.
3. Contractor, at his own expense, shall make test borings or dig test holes to locate and determine the depth to groundwater, including a determination of any seasonal variations concerning same. Any/all expenses for making test borings and/or digging test holes and other investigative work shall be borne by the Contractor.

C. Survey Work: Engage a New York State licensed, and registered land surveyor or New York State licensed and registered professional engineer to survey adjacent existing buildings, structures, and site improvements; establish exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During installation of excavation support and protection systems, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations and positions for comparison with original elevations and positions. Promptly notify Owner's Representative if changes in elevations or positions occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that are either new or in serviceable condition.

B. Structural Steel: ASTM A 36/A 36M, ASTM A 690/A 690M, or ASTM A 992/A 992M.

C. Steel Sheet Piling: ASTM A 328/A 328M, ASTM A 572/A 572M, or ASTM A 690/A 690M; with continuous interlocks.

1. Corners: Site-fabricated mechanical interlock or roll-formed corner shape with continuous interlock.

D. Wood Lagging: Lumber, mixed hardwood, nominal rough thickness of size and strength required for application.

E. Cast-in-Place Concrete: ACI 301, of compressive strength required for application.

F. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

G. Tiebacks: Steel bars, ASTM A 722/A 722M.

H. Tiebacks: Steel strand, ASTM A 416/A 416M.

I. Timber Sheeting: All timber materials used for wood sheeting shall meet the requirements for Douglas Fir Dense Construction Grade or Southern Pine No. 2, Dense S3.

1. Used material shall be in good condition, not damaged or excessively pitted.

J. Filter Fabric

1. The fabric used shall conform to the specifications for Mirafi 140 Fabric, as manufactured by Celanese Fiber Marketing Company, or approved equal. The fabric shall be non-woven nylon/polypropylene fabric and shall meet the following specifications:

Properties	**Specification**
Minimum Weight	140 g/m^2
Average Thickness	30 mils
Grab Strength Wet Retention @ 70° Fahrenheit	120 lbs 100%
Grab Elongation Wet Retention @ 70° Fahrenheit	130% 40%
Trapezoid Tear Strength	65 lbs
Air Permeability	250 cfm/ft^2

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards that could develop during excavation support and protection system operations.

1. Shore, support, and protect utilities encountered.

B. Install excavation support and protection systems to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Locate excavation support and protection systems clear of permanent construction so that forming and finishing of concrete surfaces are not impeded.

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

E. Promptly repair damages to adjacent facilities caused by installing excavation support and protection systems.

F. Pilot Cut

1. Contractor may, if soil conditions permit, excavate a pilot cut prior to the installation of sheeting. This pilot cut shall not exceed a five (5) foot depth and shall be performed in accordance with Section 02315 “Excavation and Backfill”. The depth of pilot cuts for sheeting installation adjacent to rigid pavements shall be governed by a forty-five (45) degree angle of repose. Owner’s Representative may direct that there be no pilot cuts deeper than the pavement subgrade.
2. Upon installation of tight sheeting in a pilot cut, Contractor shall immediately and without delay backfill the void behind the sheeting and thoroughly compact the material in accordance with all requirements of Section 02315 “Excavation and Backfill”. No more than twenty-five (25) linear feet of sheeting may be installed in the pilot cut ahead of this backfilling and compaction procedure.

G. Areas with Limited Work Space

1. In areas where the Contractor's working space will be limited by the presence of trees, overhead and underground utilities, structures, etc., Contractor shall review with the Owner’s Representative a plan of the proposed method of construction. The plan shall include details of the method of shoring and type and size of equipment the Contractor proposes to use.
2. The plan will be reviewed by the Owner’s Representative prior to the beginning of construction in these areas. If the Contractor's method of construction will, in the opinion of the Owner’s Representative, present a threat of damage to the adjacent trees, utilities, structures, etc., the Contractor shall, at the direction of the Owner’s Representative, make adjustments in his proposed method of construction.
3. Such adjustments may include, but not be limited to, the use of an alternate sheeting method, the use of double stage sheeting, the use of smaller sheeting boxes, and/or the use of smaller equipment. Contractor will not receive additional compensation for any adjustments in his proposed method of construction ordered by the Owner’s Representative in accordance with these Specifications.

3.2 SOLDIER PILES AND LAGGING

A. Install steel soldier piles before starting excavation. Extend soldier piles below excavation grade level to depths adequate to prevent lateral movement. Space soldier piles at regular intervals not to exceed allowable flexural strength of wood lagging. Accurately align exposed faces of flanges to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment.

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

3.3 SHEET PILING

A. Before starting excavation, install one-piece sheet piling lengths and tightly interlock to form a continuous barrier. Accurately place the piling, using templates and guide frames unless otherwise recommended in writing by the sheet piling manufacturer. Limit vertical offset of adjacent sheet piling to 60 inches. Accurately align exposed faces of sheet piling to vary not more than 2 inches from a horizontal line and not more than 1:120 out of vertical alignment. Cut tops of sheet piling to uniform elevation at top of excavation.

3.4 TIEBACKS

A. Tiebacks: Drill, install, grout, and tension tiebacks. Test load-carrying capacity of each tieback and replace and retest deficient tiebacks.

1. Test loading shall be observed by a qualified licensed and registered professional engineer responsible for design of excavation support and protection system.
2. Maintain tiebacks in place until permanent construction is able to withstand lateral soil and hydrostatic pressures.

3.5 BRACING

A. Bracing: Locate bracing to clear columns, floor framing construction, and other permanent work. If necessary to move brace, install new bracing before removing original brace.

1. Do not place bracing where it will be cast into or included in permanent concrete work unless otherwise approved by Owner's Representative.
2. Install internal bracing, if required, to prevent spreading or distortion of braced frames.
3. Maintain bracing until structural elements are supported by other bracing or until permanent construction is able to withstand lateral earth and hydrostatic pressures.

3.6 REMOVAL AND REPAIRS

A. Remove excavation support and protection systems when construction has progressed sufficiently to support excavation and bear soil and hydrostatic pressures. Remove in stages to avoid disturbing underlying soils or damaging structures, pavements, facilities, and utilities.

1. Remove excavation support and protection systems to a minimum depth of 48 inches below overlaying construction and abandon remainder.
2. Fill voids immediately with approved backfill compacted to density specified in Division 02, Section "Excavation and Backfill".
3. Repair or replace, as approved by Owner's Representative, adjacent work damaged or displaced by removing excavation support and protection systems.

3.7 TIGHT SHEETING

A. Tight sheeting will be required where it is necessary to protect structures such as but not limited to, buildings, rigid pavements, drains, sewers, water mains, etc. and where shown in the Contract Documents or wherever directed by the Owner's Representative. Where tight sheeting is required, it shall be placed in such a manner which will adequately prevent the undermining of structures, rigid pavement, drains, and other utilities.

3.8 INSTALLATION AND REMOVAL OF SHEETING

A. In general, when sheeting is used for shoring of excavations it shall be driven in advance of the excavation so as to maintain the lower end of the sheeting at least twelve (12) inches below the excavation. Sheeting shall extend at least six (6) inches below the foundation grade of rigid pipes, structures, cradles or encasements.

B. When sheeting is used to support trenches within which flexible conduits (i.e., PVC sewer piping), the sheeting shall either:

1. Not be driven below an elevation six (6) inches above the crown of the pipe, or if driven below,
2. Be cut off at an elevation a minimum of six (6) inches above the crown of the pipe and be left-in-place. No payment will be made for the sheeting left-in-place.

C. When sheeting boxes are used to support trenches within which sewer pipe or force mains are to be installed, the bottom of the sheeting box shall not be placed below an elevation six (6) inches above the crown of the pipe.

D. Unless otherwise shown in the Contract Documents or as directed by the Owner's Representative, all sheeting shall extend at least four (4) foot above the ground surface. Public shall be protected from all sheeting by adequate fencing and signage.

E. All sheeting shall be framed and fitted and firmly fastened with adequate nails, spikes, bolts, chains, or wires of such sizes and lengths and at such places and in such manner as required for strength and stability. Workmanship shall be in accordance with recognized standard practices and be performed by skilled mechanics.

F. When sheeting is withdrawn, all cavities in or adjoining the trench shall be solidly filled and compacted.

G. The type of sheeting used is at the option of the Contractor except where otherwise noted in the Contract Documents and/or as directed by the Owner's Representative.

H. Contractor shall be prohibited from using vibratory hammer or other impact methods within 50 feet of existing structures.

3.9 WOOD OR STEEL SHEETING ORDERED LEFT-IN-PLACE

A. Sheeting shall be left in place where shown in the Contract Documents and/or as directed by the Owner's Representative. In other locations where soil or other conditions make it necessary that sheeting be left in place, the Owner's Representative will so order the Contractor in writing.

B. Before the backfill is completed, the sheeting to be left-in-place shall be cut off 18 to 48 inches below the final ground surface, unless otherwise directed by the Owner's Representative. All material that is cut off and all struts and wales shall be removed from the trench and legally disposed of.

C. When sheeting is left in place, all cavities behind the sheeting shall be solidly filled and compacted in accordance with all requirements of Division 02, Section "Excavation and Backfill".

END OF SECTION 02250

NO TEXT THIS PAGE

SECTION 02315 – EXCAVATION AND BACKFILL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals required to perform all excavating, backfilling, filling and grading, and disposing of earth materials as shown, specified, and required for construction of structures, manholes, vaults, conduits, pipelines, roads, and other facilities required to complete the Work in every respect.
2. All necessary preparation of subgrade for roads, drives, structures, slabs and pavements is included.
3. All temporary means needed to prevent discharge of sediment to water courses from dewatering systems or erosion is included.
4. No classification of excavated materials will be made. Excavation includes all materials regardless of type, character, composition, moisture, or condition thereof. Excavation shall also include stockpiling of materials, which in the opinion of the Owner's Representative, are suitable for backfill and embankment material. The cost of removal, transportation, and disposal of spoil material shall be included in the Contractor Bid.
6. Contractor shall engage the services of a qualified soils laboratory to conduct continuous soils testing during grading operations. The soils laboratory and its work on this Project shall be approved by the Owner's Representative.
7. Contractor shall immediately notify the construction of structures, manholes, vaults, conduits, pipelines, roads, and other facilities required to complete the Work and cease related excavation activities upon the discovery of abandoned graves, wells, fuel tanks and hazardous or non-hazardous waste disposal sites. Excavation, backfill, and compaction for construction of structures, manholes, vaults, conduits, pipelines, roads, and other facilities required to complete the Work shall be to the horizontal alignment and vertical elevations shown in the Contract Documents, as detailed in these Specifications and as required by the construction of structures, manholes, vaults, conduits, pipelines, roads, and other facilities required to complete the Work to meet the requirements of the Work.

B. Related Sections:

1. Section 01400, Quality Control
2. Section 02240, Sediment and Erosion Control Plan
3. Section 02250, Excavation Support and Protection
4. Section 02320, Dewatering
5. Section 02580, Sanitary Manholes, Frames and Covers
6. Section 02920, Site Restoration
7. Section 11300, Grinder Pump Station (EOne)
8. Section 15051, Buried Pipe Installation

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American Institute of Steel Construction, (AISC):

    a. AISC Specifications for the Design, Fabrication, and Erection of Structural Steel for Buildings.

2. American Society for Testing and Materials, (ASTM):

    a. ASTM A 36, Specification for Structural Steel.
    b. ASTM A 328, Specification for Steel Sheet Piling.
    c. ASTM D 422, Method for Particle-Size Analysis of Soils.
    d. ASTM D 427, Test Methods for Shrinkage Factors of Soils by the Mercury Method.
    e. ASTM D 1556, Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method.
    f. ASTM D 1557, Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft 16/cu ft) (2,700 KN-m/cum).
    g. ASTM D 2166, Test Method for Unconfined Compressive Strength Of Cohesive Soils.
    h. ASTM D 2922, Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth).
    i. ASTM D 4318, Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.
    j. ASTM D6938, Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth).

3. Occupational Safety and Health Administration, (OSHA):

    a. OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .650 (Subpart P - Excavations).

4. Uniform Building Code, (UBC).

1.3 QUALITY ASSURANCE

A. Testing Services:

1. General: Testing of materials, testing for moisture content during placement and compaction of fill materials, and of compaction requirements for compliance with technical requirements of these Specifications shall be performed by a testing laboratory as specified in Section 01400, Quality Control. Testing shall conform to: ASTM D422, ASTM D427, ASTM D1556, ASTM D1557, ASTM D2166, ASTM D6938, and ASTM D4318.

2. Testing Agency Scope:

    a. Test Contractor's proposed materials in the laboratory and field for compliance with these Specifications.
    b. Perform field moisture content and density tests to assure that the specified compaction of backfill materials has been obtained.
    c. Report all test results to the Owner's Representative and Contractor.

3. Authority and Duties of Testing Agency: Technicians representing the testing laboratory shall inspect the materials in the field and perform tests and shall report their findings to the Owner's

Representative and Contractor. When the materials furnished or the Work performed fails to fulfill Specification requirements, the technician will direct the attention of the Owner's Representative and Contractor to such failure.

a. The technician shall not act as foreman or perform other duties for Contractor. Work will be checked as it progresses, but failure to detect any defective Work or materials shall not in any way prevent later rejection when such defect is discovered, nor shall it obligate the Owner's Representative for final acceptance. Technicians are not authorized to revoke, alter, relax, enlarge, or release any requirements of the Contract Documents, nor to approve or accept any portion of the Work.

4. Responsibilities and Duties of Contractor Relative to Testing:

a. The use of testing services shall in no way relieve Contractor of the responsibility to furnish materials and construction in full compliance with the Contract Documents.
b. To facilitate testing services, Contractor shall:

1) Secure and deliver to the Owner's Representative or testing agency, without cost, preliminary representative samples of the materials he proposes to use and which are required to be tested.
2) Furnish such labor as is necessary to obtain and handle samples at the Site or at other sources of material.
3) Advise the testing agency at least two days in advance of any backfill operations to allow for completion of quality tests and for the assignment of personnel.

c. Contractor's Testing Service shall inspect and approve subgrades and fill layers before further construction Work is performed thereon.
d. It shall be the responsibility of Contractor to accomplish the specified compaction for backfill, fill, and other earthwork. It shall be the responsibility of Contractor to control his operations by confirmation tests to verify and confirm that Contractor has complied, and is complying at all times, with the requirements of these Specifications concerning compaction, control, and testing.
e. The frequency of Contractor's confirmation tests shall be not less than as follows; each test location for trenches shall include tests for each layer, type, or class of backfill from bedding to finish grade.

1) Trenches for structures, and underground ductbanks:

a) In Open Fields: Two locations every 1,000 linear feet.
b) Along Dirt or Gravel Roads or Off Traveled Right-of-Way: Two locations every 500 linear feet.
c) Crossing Paved Roads: Two locations along each crossing.
d) Under Pavement Cuts or Within Two Feet of Pavement Edges: One location every 400 linear feet.

2) For Structural Backfill: On 30-foot intervals on all sides of the structure for every compacted lift, but no less than one per lift on each side of the structure for structures less than 60 feet long on a side.
3) In Embankment or Fill: One per 1,000 square feet on every compacted lift.
4) Base Material: One per 1,000 square feet on every compacted lift.

f. Copies of the test reports shall be submitted promptly to the Owner's Representative. Contractor's tests shall be performed by a soils testing laboratory acceptable to the Owner's Representative.

g. Contractor shall demonstrate the adequacy of compaction equipment and procedures before exceeding any of the following amounts of earthwork quantities:

1) 100 linear feet of trench backfill.
2) 10 cubic yards of structural backfill.
3) 100 cubic yards of embankment work.
4) 50 cubic yards of base material.

h. Until the specified degree of compaction on the previously specified amounts of earthwork is achieved, no additional earthwork of the same kind shall be performed.

i. Periodic compliance tests may be made by the Owner's Representative to verify that compaction is conforming to the requirements previously specified, at no cost to Owner. Contractor shall remove the overburden above the level at which the Owner's Representative wishes to test and shall backfill and recompact the excavation after the test is complete.

j. If compaction fails to conform to the specified requirements, Contractor shall remove and replace the backfill at proper density or shall bring the density up to specified level by other means acceptable to the Owner's Representative. Subsequent tests required to confirm and verify that the reconstructed backfill has been brought up to specified density shall be paid by Contractor. Contractor's confirmation tests shall be performed in a manner acceptable to the Owner's Representative. Frequency of confirmation tests for remedial Work shall be double that amount specified for initial confirmation tests.

B. Permits and Regulations:

1. Obtain all necessary permits for work in roads, rights-of-way, railroads, and other property where permits are required. Also, obtain permits as required by local, state and federal agencies for discharging water from excavations.
2. Perform excavation work in compliance with applicable requirements of governing authorities having jurisdiction.
3. Comply with OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Subpart P – Excavations

1.4 SUBMITTALS

A. Excavation Plan: Prior to start of excavation operations, submit written plan to demonstrate compliance with OSHA Standard 29 CFR Part 1926.650. As a minimum, excavation plan shall include:

1. Name of competent person.
2. Excavation method(s) or protective system(s) to be used.
3. Copies of "manufacturer's data" or other tabulated data if protective system(s) are designed on the basis of such data.

B. Contractor shall prepare and submit shop drawings for the following items, as required and/or as directed by Owner's Representative:

1. Sheeting and bracing, or other protective system(s).
2. Dewatering system(s).
3. Cofferdams.
4. Underpinning.
5. Sediment and Erosion Control.

Shop drawings shall be prepared by a licensed and registered Professional Engineer in the State of New York. Shop drawings shall be submitted to Owner's Representative for record purposes only. Calculations and all other pertinent information shall be submitted. Shop drawing submittals will not be checked and will not imply approval by Owner's Representative of the Work involved. Contractor shall be solely responsible for designing, installing, operating and maintaining whatever system is necessary to satisfactorily accomplish all necessary sheeting, bracing, protection, underpinning and dewatering.

C. Submit description of source, material classification and product description, production method, and application of backfill materials. Submit test results for samples of off-site backfill materials.

D. Test Reports - Borrow, Backfill and Grading:

1. Testing laboratory shall submit copies of the following reports directly to Owner's Representative, with copy to Contractor:

a. Tests on borrow material.
b. Tests on footing subgrade.
c. Field density tests.
d. Optimum moisture - maximum density curve for each soil used for backfill.
e. Tests of actual unconfined compressive strength or bearing tests of each strata.

E. Submit samples of all select fill, gravel and base materials, as required.

1. Deliver samples to Owner's Representative, if requested.

F. Provide delivery ticket which includes source location for each delivery of material that is obtained from offsite sources.

1.5 JOB CONDITIONS

A. Subsurface Information: Limited site soil boring data, samples and soil reports are available for inspection and are for informational purposes only. Any opinions expressed in these reports are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by a geotechnical engineer. Owner shall not be responsible for interpretations or conclusions drawn from this data. Contractor must make his own interpretation of subsurface conditions that may affect methods or the cost of construction of the Work.

B. Contractor shall satisfy himself by actual examination of the site of the Work, as no claim shall be made by the Contractor for additional compensation by reasons of the fact that existing conditions are other than as shown in the Contract Documents.

C. Contractor, at his own expense, shall make test borings or dig test holes/pits to locate existing underground facilities prior to excavation. Where possible and without additional cost to the Owner, adjustments shall be made to the location of the proposed work to avoid encountering or interfering with existing underground facilities. All expenses for digging test holes and other investigative work shall be borne by the Contractor.

D. Existing Structures: Contract Documents indicate certain surface and underground structures adjacent to the Work. This information has been obtained from existing records. It is not guaranteed to be correct or complete and is shown for the convenience of Contractor. Contractor shall explore ahead of the required excavation to determine the exact location of all structures. They shall be supported and protected from damage by Contractor. If they are broken or damaged, they shall be restored immediately by Contractor at his expense.

C. Existing Utilities: Locate existing underground utilities in the areas of the Work. If utilities are to remain in place, provide adequate means of support and protection during all operations.

1. Should uncharted or incorrectly charted piping or other utilities be encountered during excavation, consult piping or utility owner and Owner's Representative immediately for directions as to procedure. Cooperate with Owner and utility owner in keeping services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.
2. In general and where applicable, service lines to individual houses and businesses are not shown; however, Contractor shall assume that a service exists for each utility to each house or business and shall provide adequate means of support and protection during all operations.
3. Do not interrupt existing utilities serving facilities occupied and used by Owner or others, except when permitted in writing by Owner's Representative and then only after acceptable temporary utility services have been provided.
4. Demolish and completely remove from the Site existing underground utilities indicated to be removed. Coordinate with utility companies for shut-off of services if lines are active.

D. Use of Explosives:

1. The use of explosives will not be permitted.

E. Protection of Persons and Property: Barricade open excavations occurring as part of the Work and post with warning lights. Operate warning lights during hours from dusk to dawn each day and as otherwise required.

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.
2. Obtain written permission from property owner before removing, trimming, or disturbing trees, shrubs, plants, fences, rails, walks, structures or other facilities encountered on the line of the excavation.

F. Dust Control: Conduct all operations and maintain areas of activity, including watering of operations, sweeping and sprinkling of roadways, to minimize creation and dispersion of dust.

G. Roadways and Walks: Unless otherwise directed by Owner's Representative, excavated material and materials of construction shall be so deposited, and the Work shall be so conducted, as to leave open and free for pedestrian traffic all crosswalks, and for vehicular traffic a roadway not less than ten (10)

feet in width. All hydrants, valves, fire alarm boxes, letter boxes, and other facilities which may require access during construction shall be kept accessible for use. During the progress of the Work, Contractor shall maintain such crosswalks, sidewalks, and roadways in satisfactory condition and the Work shall at all times be so conducted as to cause a minimum of inconvenience to public travel, and to permit safe and convenient access to private and public property along the line of the Work.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. Backfill and Fill:

1. Materials acceptable for use as backfill against walls, foundations, underground ductbanks, and other structures shall be stockpiled native sandy clay or granular soils obtained from onsite excavations and which are uniformly mixed, contain no organic matter, debris, waste, frozen materials, vegetation or other organic matter and other deleterious materials or debris, nor contain rocks or fragments greater than 4-inches in size, nor have greater than 40 percent passing the 200 sieve. The maximum expansion of onsite materials shall be 1.5 percent as performed on a sample remolded to approximately 95 percent of the maximum dry density as determined in accordance with ASTM D 698 at two percent below optimum moisture content under a 100 psf surcharge pressure.
2. Backfill and fill materials from offsite sources shall consist of silty or clayey sand soils that are uniformly mixed, contain no organic matter, debris, waste, frozen materials, vegetation or other organic matter and other deleterious materials or debris and which have a Plasticity Index less than ten. The maximum particle size of imported soils shall be 4-inches or less, if required to satisfy trenching, landscaping, or other requirements. The maximum expansion of offsite materials shall be 1.5 percent as performed on a sample remolded to approximately 95 percent of the maximum dry density as determined in accordance with ASTM D 698 at two percent below optimum moisture content under a 100 psf surcharge pressure.
3. All materials for use as backfill and fill material shall be tested by the laboratory and approved by the Owner's Representative.
4. If onsite material is unsuitable as determined by the Owner's Representative, select backfill shall be used.
5. Fill adjacent to structures is classified as backfill to a distance measured horizontally from the structure that is equal to the depth from the finished grade. Outside these limits the fill is classified as embankments, unless otherwise specified.

B. Select Backfill:

1. Select Backfill for use beneath structures, concrete slabs and asphalt pavements (and where shown or specified below and around structures) shall be crushed aggregate conforming to the requirements below:

Sieve Sizes (Square Openings)	Percentage by Weight Passing Sieve
1¼ inch	100
No. 4	38 to 65
No. 8	25 to 60
No. 30	10 to 40

No. 200	3 to 12

2. Place select fill where shown or specified, and around and under foundations, tanks, pipelines, structures, roads, walks, and other Work.
3. Use well graded granular material or bank-run gravel, free from vegetation or other organic matter, debris, waste, frozen materials, vegetation and other deleterious materials.
4. Gradation: Not more than 70 percent by weight shall pass through a No. 40 sieve; not more than 10 percent by weight shall pass through a No. 200 sieve; and 100 percent shall pass a four-inch square sieve.
5. When required, submit Sample of material.

C. Fill Material for Embankments:

1. Fill materials for use as embankments, and as miscellaneous landscaping materials exterior to plant facilities, shall consist of soils obtained from on-site excavations or off-site sources that are uniformly mixed, shall contain no organic material, debris, waste, frozen materials, vegetation or other organic matter and other deleterious materials or debris and shall be free of rocks or fragments greater than 3-inches in size.
2. All materials for use as described above shall be tested by the laboratory and approved by the Owner's Representative.

D. Drainage Fill:

1. Washed, uniformly graded mixture of crushed stone, or crushed or uncrushed gravel, with 100 percent passing a 1-1/2 inch sieve and not more than five percent passing a No. 4 sieve.

E. Sand:

1. Sand material shall contain no organic material, debris, waste, frozen materials, vegetation or other organic matter and other deleterious materials or debris. Sand shall be nonplastic, when tested in accordance with ASTM D 4318, 100 percent shall pass a 1/2-inch screen and no more than 20 percent shall pass a No. 200 screen.
2. The sand shall be deposited in uniform layers not to exceed 6-inches in uncompacted thickness. The backfill shall be compacted to not less than 95 percent of laboratory maximum density as determined by ASTM D 698.
3. All material for sand must be tested and approved by the Owner's Representative.
4. No sand shall be placed without the approval of the Owner's Representative.

F. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, or natural or crushed sand and containing no organic material, debris, waste, frozen materials, vegetation or other organic matter and other deleterious materials or debris and approved by Owner's Representative.

G. General Backfill and Fill Materials:

1. Provide approved soil materials for backfill and fill, free of clay, rock or gravel larger than 3-inches in any dimension, debris, waste, frozen materials, vegetation and other organic matter and other deleterious materials. Previously excavated onsite materials meeting these requirements may be used for backfill.

2.2 GEOTEXTILES

A. Subsurface Drainage Geotextile: Nonwoven needle-punched geotextile, manufactured for subsurface drainage applications, made from polyolefins or polyesters; with elongation greater than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 157 lbf; ASTM D 4632.
3. Sewn Seam Strength: 142 lbf; ASTM D 4632.
4. Tear Strength: 56 lbf; ASTM D 4533.
5. Puncture Strength: 56 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 40 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.5 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

B. Separation Geotextile: Woven geotextile fabric, manufactured for separation applications, made from polyolefins or polyesters; with elongation less than 50 percent; complying with AASHTO M 288 and the following, measured per test methods referenced:

1. Survivability: Class 2; AASHTO M 288.
2. Grab Tensile Strength: 247 lbf; ASTM D 4632.
3. Sewn Seam Strength: 222 lbf; ASTM D 4632.
4. Tear Strength: 90 lbf; ASTM D 4533.
5. Puncture Strength: 90 lbf; ASTM D 4833.
6. Apparent Opening Size: No. 60 sieve, maximum; ASTM D 4751.
7. Permittivity: 0.02 per second, minimum; ASTM D 4491.
8. UV Stability: 50 percent after 500 hours' exposure; ASTM D 4355.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 36 inches deep; colored as follows:

1. Red: Electric, Fire, Cathodic Protection.
2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Fiber Optics, Telephone and other communications.
4. Blue: Water, Potable Water systems.
5. Green: Sewer, Storm Drain, Force Main systems.

PART 3 -EXECUTION

3.1 INSPECTION

A. Provide Owner’s Representative with sufficient notice and with means to examine the areas and conditions under which excavating, filling, and grading are to be performed. Owner’s Representative will notify Contractor, in writing, if conditions are found that may be detrimental to the proper and

timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected in an acceptable manner.

3.2 SITE PREPARATION

A. Clear all areas to be occupied by permanent construction or embankments of all trees, brush, roots, stumps, logs, wood and other deleterious materials and debris. Clean and strip subgrades for fills and embankments of vegetation, sod, topsoil and organic matter. All waste materials shall be removed from the Site and properly disposed of by Contractor. Burning will not be permitted.

3.3 TEST PITS

A. General:

1. Contractor shall excavate and backfill, in advance of the construction, test pits to determine conditions or location of the existing utilities and structures. Contractor shall perform all the Work required in connection with excavating, stockpiling, maintaining, sheeting, shoring, backfilling and replacing pavement for the test pits.

a. Contractor shall be responsible for the definite location of each existing facility involved within the area of excavation for the Work under this Contract. Care shall be exercised during such location work to avoid damaging and/or disrupting the affected facility. Contractor shall be responsible for repairing, at his expense, damage to any structure, piping, or utility caused by his Work.

B. No separate payment will be made for test pits.

3.4 EXCAVATION

A. Perform all excavation required to complete the Work, as shown, specified and as required. Excavations shall include earth, sand, clay, gravel, hardpan, boulders not requiring drilling and blasting for removal, decomposed rock, pavements, rubbish and all other materials within the excavation limits.

B. Excavations for structures and pipelines shall be open excavations. Provide excavation protection system(s) required by ordinances, codes, law and regulations to prevent injury to workmen and to prevent damage to new and existing structures or pipelines. Unless shown or specified otherwise, protection system(s) shall be utilized under the following conditions.

1. Excavation Less Than Five Feet Deep: Excavations in stable rock or in soil conditions where there is no potential for a cave-in may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded, or shored and braced.
2. Excavations Greater Than Five Feet Deep: Excavations in stable rock may be made with vertical sides. Under all other conditions, excavations shall be sloped and benched, shielded or shored and braced.
3. Excavation protection system(s) shall be installed and maintained in accordance with drawings submitted under Article 1.4 of this Section.

C. Where the structure or pipeline is to be placed below the ground water table, well points, cofferdams or other acceptable methods shall be used to permit construction of said structure or pipeline under

dry conditions. Dry conditions shall prevail until concrete has reached sufficient strength to withstand earth and hydrostatic loads and until the pipelines are properly jointed, tested and backfilled. In addition, protect excavation from flooding until all walls and floor framing up to and including grade level floors are in place and backfilling has begun. Water level shall be maintained below top of backfill at all times.

D. Pumping of water from excavations shall be done in such a manner to prevent the carrying away of unsolidified concrete materials, and to prevent damage to the existing subgrade.

E. The elevation of the bottom of footings shown shall be considered as approximate only and Owner's Representative may direct such changes in dimensions and elevations as may be required to secure a satisfactory footing. All structure excavations shall be hand-trimmed to permit the placing of full widths, and lengths of footings on horizontal beds. Rounded and undercut edges will not be permitted.

F. When excavations are made below the required grades, without the written order of Owner's Representative, they shall be backfilled with compacted gravel or concrete, as directed by Owner's Representative in writing, at the expense of Contractor.

G. Excavations shall be extended sufficiently on each side of structures, footings, etc., to permit setting of forms, installation of shoring or bracing or the safe sloping of banks.

H. Subgrades for roadways, structures and trench bottoms shall be firm, dense, and thoroughly compacted and consolidated; shall be free from mud, muck, and other soft or unsuitable materials; and shall remain firm and intact under all construction operations. Subgrades which are otherwise solid, but which become soft or mucky on top due to construction operations, shall be reinforced with crushed stone or gravel. The finished elevation of stabilized subgrades shall not be above subgrade elevations shown.

I. Pipe Trench Preparation:

1. No more than 100 feet of trench may be opened in advance of pipe laying. Trenches in rock shall be fully opened at least 30 feet in advance of where pipe is being laid.
2. Trench width shall be minimized to greatest extent practical but shall conform to the following:

    a. Sufficient to provide room for installing, jointing and inspecting piping, but in no case wider at top of pipe than pipe barrel OD plus two feet.
    b. Enlargements at pipe joints may be made if required and approved by Owner's Representative.
    c. Sufficient for shoring and bracing or shielding and dewatering.
    d. Sufficient to allow thorough compaction of backfill adjacent to bottom half of pipe.
    e. Do not use excavating equipment which requires the trench to be excavated to excessive width.
    f. Piping four inches in diameter and larger shall be excavated at least six inches below bottom of pipe and backfilled with pipe bedding material, unless otherwise specified on the Contract Drawings.

3. Depth of trench shall be as shown. If required and approved by Owner's Representative, in writing, depths may be revised.

J. Repair effects of settlement of fill and at no additional cost to the Owner.

K. Material Storage: Stockpile satisfactory excavated materials in approved areas, until required for backfill or fill. Place, grade and shape stockpiles for proper drainage.

1. Locate and retain soil materials away from edge of excavations.
2. Dispose of excess soil material and waste materials as specified herein.
3. Stockpiled excavated soils for use as subsequent fill shall be classified by laboratory as on-site granular or sandy clay soils. Use and placement of fill shall be performed as specified for each class.
4. Excess soil from excavations shall be legally transported and disposed of offsite. Disposal shall be in accordance with state and local regulatory requirements.
5. If all excavated material cannot be stored in the right-of-way in such manner as to maintain traffic conditions as specified, remove surplus material from the Work area and store. After laying pipe or completing structure being built in trench, bring material back to trench in sufficient quantity of suitable excavated material as necessary for backfilling trench.
6. In built-up work areas and in streets where traffic conditions require, remove material excavated from initial opening of excavation as soon as it is excavated; use suitable material subsequently excavated to backfill trenches in which pipe has been installed or structures built. Do not store excavated material or construction materials on streets or sidewalks.

L. Where Owner's Representative considers the existing material beneath the bedding material unsuitable, Contractor shall remove and replace it with select backfill.

3.5 UNAUTHORIZED EXCAVATION

A. Excavation outside lines and grades shown and that are not approved by Owner's Representative, together with removal and disposal of associated material, shall be made, filled, and restored at Contractor's expense. Unauthorized excavations shall be filled and compacted with select fill or concrete. Claims and damages resulting from Contractor's unauthorized excavation will be Contractor's sole responsibility.

3.6 EROSION CONTROL, DRAINAGE AND DEWATERING

A. Erosion Control:

1. In general, the construction procedures outlined herein shall be implemented to assure minimum damage to the environment during construction. Contractor shall take any and all additional measures required to conform to the requirements of applicable codes and regulations, and the requirements specified in Section 02240, Sediment and Erosion Control Plan.
2. Whenever possible, access and temporary roads shall be located and constructed to avoid environmental damage. Provisions shall be made to regulate drainage, avoid erosion and minimize damage to vegetation.
3. Where areas must be cleared for storage of materials or temporary structures, provisions shall be made for regulating drainage and controlling erosion, subject to the Owner's Representative's approval.
4. Temporary measures shall be applied to control erosion and to minimize the silting of the existing waterways, and natural ponding areas. Such measures shall include, but are not limited to, the use of berms, baled straw silt barriers, gravel or crushed stone, mulch, slope drains and other methods. These temporary measures shall be applied to erodible materials exposed by any activities associated with the construction of this Work.

a. Special care shall be taken to eliminate depressions that could serve as mosquito pools.
b. Temporary measures shall be coordinated with the construction of permanent drainage facilities and other Work to the extent practicable to assure economical, effective, and continuous erosion and silt control.
c. Contractor shall provide special care in areas with steep slopes. Disturbance of vegetation shall be kept to a minimum to maintain stability.

5. Remove only those shrubs and grasses that must be removed for construction. Protect the remainder to preserve their erosion-control value.
6. Install erosion and sediment control practices where shown in the Contract Documents and according to applicable standards, codes and specifications. The practices shall be maintained in effective working condition during construction and until the drainage area has been permanently stabilized.
7. Mulching shall be used for temporary stabilization.

    a. Suitable Materials for Mulching:

        1) Unrotted Straw or Salt Hay: 1-1/2 to 2 tons/acre
        2) Asphalt Emulsion or Cutback Asphalt: 600 to 1,200 gal./acre
        3) Wood-fiber or Paper-fiber (hydroseeding): 1,500 lbs./acre
        4) Mulch netting (paper, jute, excelsior, cotton or plastic)

    b. Straw or salt hay mulches should be immediately anchored using peg and twine netting or mulch anchoring tool or liquid mulch binders.

8. After stabilization, remove and provide for legal transportation and disposal of all straw bale dikes, debris, etc., from the Site.
9. In the event of any temporary Work stoppage, Contractor shall take steps to correct any temporary or environmental damage to the area undergoing construction.
10. In the event Contractor repeatedly fails to satisfactorily control erosion and siltation, the Owner reserves the right to employ outside assistance or to use its own forces to provide the corrective measures indicated. The cost of such work, plus engineering costs, will be deducted from monies due Contractor.
11. Contractor shall prevent blowing and movement of dust from exposed soil surfaces and access roads to reduce on and off-site damage and health hazards. Control may be achieved by irrigation in which the Site shall be sprinkled with water until the surface is moist. The process shall be repeated, as required.

B. Drainage and Dewatering:

1. Contractor shall provide and maintain adequate drainage and dewatering equipment to remove and dispose of all surface water and ground water entering excavations, or other parts of the Work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, therein is inspected by the Owner's Representative and backfill operations have been completed and approved.

    a. The different working areas on the Site shall be kept free of surface water at all times. Contractor shall install drainage ditches and dikes and shall perform all pumping and other Work necessary to divert or remove rainfall and all other accumulations of surface water from the excavations and fill areas. The diversion and removal of surface water shall be performed in a manner that will prevent the accumulation of water behind temporary

structures or at any other locations within the construction area where it may be detrimental.

b. Water used for working or processing, resulting from dewatering operations, or containing oils or sediments that will reduce the quality of the water downstream of the point of discharge, shall not be directly discharged. Such waters shall be diverted through a settling basin or filter before being discharged.

c. Contractor will be held responsible for the condition of any pipe, conduit or channel used for drainage purposes and all such pipes, conduits or channels shall be left clean and free of sediment.

d. Remove water from excavations as fast as it collects.

2. Contractor shall provide, install and operate sufficient trenches, sumps, pumps, hose, piping, well points, deep wells, etc., necessary to depress and maintain the ground water level below the base of the excavations during all stages of construction operations. The ground water table shall be lowered in advance of excavation, for a sufficient period of time so as to permit dewatering of fine grain soils and maintained two (2) feet below the lowest subgrade excavation made until the structure has sufficient strength and weight to withstand horizontal and vertical soil and water pressures from natural ground water. The system shall be operated on a 24-hour basis and standby pumping facilities and personnel shall be provided to maintain the continued effectiveness of the system. If, in the opinion of the Owner's Representative, the water levels are not being lowered or maintained as required by these Specifications, Contractor shall install additional or alternate dewatering devices as necessary, at no additional cost to the Owner.

a. Elements of the dewatering system shall be located so as to allow a continuous dewatering operation without interfering with the construction of the permanent Work. Where portions of the dewatering system are located in the area of permanent construction, Contractor shall submit details of the methods he proposes to construct the permanent Work in this location for the review by the Owner's Representative. Controls of groundwater shall continue until the permanent construction provides sufficient dead load to withstand the hydrostatic uplift of the normal groundwater, until concrete has attained sufficient strength to withstand earth and hydrostatic loads, and until all waterproofing Work has been completed. Dispose of all water removed from the excavation in such a manner so as not to endanger any portion of the Work under construction or completed. Convey water from the excavations in a closed conduit. Before discontinuing dewatering operations or permanently permitting the rise of the ground water level, computations shall be made to show that any structure affected by the water level rise is protected by backfill or other means to sustain uplift. Use a safety factor of 1.25 when making these computations.

b. Dewatering operations shall not be discontinued without the prior authorization of the Owner's Representative.

c. Design of dewatering system, including both drawings and calculations, shall be performed by a licensed and registered Professional Engineer in the State of New York and shall be employed by the Contractor. Dewatering system shall be designed so as to avoid settlement or damage to existing structures and utilities.

C. Disposal of Water Removed by Dewatering System:

1. Contractor's Dewatering System shall discharge to a location approved by the NYSDEC.
2. Dispose of all water removed from the excavation in such a manner as not to endanger public health, property, or any portion of the Work under construction or completed.

3. Dispose of water in such a manner as to cause no inconvenience to Owner, Owner's Representative, or others involved in Work about the Site.
4. Convey water from the construction Site in a closed conduit. Do not use trench excavations as temporary drainage ditches.

3.7 SHEETING, SHORING AND BRACING

A. General:

1. Used material shall be in good condition, not damaged or excessively pitted. All steel or wood sheeting designated to remain in place shall be new. New or used sheeting may be used for temporary work.
2. All timber used for breast boards (lagging) shall be new or used, meeting the requirements for Douglas Fir Dense Construction grade with a bending strength not less than 1,500 psi or Southern Pine No. 2 Dense.
3. All steel work for sheeting, shoring, bracing, cofferdams etc., shall be designed in accordance with the provisions of the "Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings", of the AISC, except that field welding will be permitted.
4. Steel sheet piling shall be manufactured from steel conforming to ASTM A 328. Steel for soldier piles, wales and braces shall be new or used and shall conform to ASTM A 36.
5. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.
6. Unless otherwise shown, specified, or directed, all materials used for temporary construction shall be removed when Work is completed. Such removal shall be made in a manner not injurious to the structure or its appearance or to adjacent Work.
7. Provide permanent steel sheet piling or pressure creosoted timber sheet piling wherever subsequent removal of sheet piling might permit lateral movement of soil under adjacent structures. Cut off tops, as required, and leave permanently in place.
8. The clearances and types of the temporary structures, insofar as they affect the character of the finished Work, and the design of sheeting to be left in place, will be subject to the approval of Owner's Representative; but Contractor shall be responsible for the adequacy of all sheeting, shoring, bracing, coffer-damming and other temporary measures.
9. Safe and satisfactory sheeting, shoring and bracing shall be the entire responsibility of Contractor.
10. All municipal, County, State and Federal ordinances, codes, regulations and laws shall be observed.
11. Unless otherwise shown, specified, or ordered, remove materials used for temporary construction when the Work is complete. Removal shall be made in manner not injurious to the Work.

B. Sheeting Left in Place:

1. Steel sheet piling shown to be left in place shall consist of rolled sections of the continuous interlocking type, unless otherwise approved. The type and design of the sheeting and bracing shall conform to the above Specifications for all steel work for sheeting and bracing. Steel sheeting designated to be left in place shall be new.
2. Steel sheet piling to be left in place shall be driven straight to the lines and grades as shown or directed. The piles shall penetrate into firm materials with secure interlocking throughout the entire length of the pile. Damaged piling having faulty alignment shall be pulled and replaced by new piling.

3. The type of guide structure used and method of driving for steel sheet piling to be left in place shall be subject to the approval of Owner's Representative. Jetting will not be permitted.
4. Cut off piling left in place to the grades shown or directed by Owner's Representative and remove the cut off pilings from the Site.
5. Clean wales, braces and all other items to be embedded in the permanent structure and ensure that the concrete surrounding the embedded element is sound and free from air pockets or harmful inclusions. Provisions shall include the cutting of holes in the webs and flanges of wale and bracing members, and the welding of steel diaphragm waterstops perpendicular to the centerline of brace ends which are to be embedded.
6. Subsequent to removal of the inside face forms, and when removal of bracing is permitted, cut back steel at least 2-inches inside the wall face and patch opening with cement mortar. Concrete shall be thoroughly worked beneath wales and braces, around stiffeners and in any other place where voids may be formed.
7. Portions of sheeting or soldier piles and breast boards which are in contact with the foundation concrete shall be left in place, together with wales and bracing members which are cast into foundation or superstructure concrete.

C. Removal of Sheeting and Bracing:

1. Remove sheeting and bracing from excavations, unless otherwise directed by Owner's Representative, in writing. Removal shall be done so as to not cause injury to the Work. Removal shall be equal on both sides of excavation to ensure no unequal loads on pipe or structure.
2. Defer removal of sheeting and bracing, where removal may cause soil to come into contact with concrete, until the following conditions are satisfied:

    a. Concrete has cured a minimum of seven days.
    b. Wall and floor framing, up to and including, grade level floors are in place.

3.8 TRENCH SHIELDS

A. Excavation of earth material below the bottom of a shield shall not exceed the limits established by ordinances, codes, laws and regulations.

B. When using a shield for pipe installation:

1. Any portion of the shield that extends below the mid-diameter of an installed rigid pipe (e.g., PCCP) shall be raised above this point prior to moving the shield ahead for the installation of the next length of pipe.
2. The bottom of the shield shall not extend below the mid-diameter of installed flexible pipe (e.g., Steel, DI, PVC, etc.) at any time.

C. When using a shield for the installation of structures, the bottom of the shield shall not extend below the top of the bedding for the structures.

D. When a shield is removed or moved ahead, extreme care shall be taken to prevent the movement of pipe or structures or the disturbance of the bedding for pipe or structures. Pipe or structures that are disturbed shall be removed and reinstalled as specified.

3.9 GENERAL REQUIREMENTS FOR BACKFILL AND COMPACTION

A. Furnish, place and compact all select backfill, backfill, fill and other materials required for structures, embankments, pipelines, ductbanks and other requirements and required to provide the finished grades as shown and as described herein shall be furnished, placed and compacted by Contractor.

B. Backfill excavations as promptly as Work permits, but not until completion of the following:

1. Acceptance by the Owner's Representative of construction below finish grade, including dampproofing, waterproofing and perimeter insulation.
2. Inspection, testing, approval, and recording of locations of underground facilities including connections, branches, valves, structures, ductbanks and utilities.
3. Removal of concrete formwork.
4. Removal of shoring and bracing and backfilling of voids with satisfactory materials. Cut off tops of temporary sheet piling driven below bottom of structures and remove in manner to prevent settlement of Underground Facilities or leave in place if required.
5. Removal of trash and debris.
6. Permanent or temporary horizontal bracing is in place on horizontally supported walls.
7. Placement of settlement plates.

C. Fill containing organic materials, debris, waste, frozen materials, vegetation or other organic matter and other deleterious materials or debris or other unacceptable material shall be removed and replaced with approved fill material as specified.

D. Placement of Select Backfill, Backfill and Fill:

1. Select backfill shall be placed to the grades shown. Bring backfill around structures and piping up evenly on all sides. The lift thickness and compaction moisture content range given herein is approximate. These values shall be finally determined from the laboratory test results on the fill materials.
2. All select backfill shall be placed in horizontal loose lifts, not exceeding eight (8) inches in thickness, and shall be mixed and spread in a manner assuring uniform lift thickness after placing. Each lift shall be compacted by not less than two (2) complete coverages of the specified compactor. Compaction in open areas should consist of self-propelled 10-ton vibratory drum rollers. In confined areas, the loose lift thickness should not exceed six (6) inches. Cobbles or boulders having sizes exceeding three (3) inches in size should be removed prior to compaction. Select backfill shall be placed to the underside of all concrete slabs. The fill material shall extend a minimum of two (2) feet outside the face of each structure and be 12-inches below finished grade on all structures. The maximum slope of select backfill to the subgrade shall be one vertical to one horizontal.
3. Backfill and fill around and outside of structures and over select backfill shall be deposited in layers not to exceed 8-inches in uncompacted thickness and mechanically compacted, using platform type tampers. Compaction of structures backfilled by rolling will be permitted provided the desired compaction is obtained and damage to the structure is prevented. Compaction of select backfill and/or backfill by inundation with water will not be permitted. All materials shall be deposited as specified herein and as shown in the Contract Documents.
4. The material shall be placed at a moisture content and density as specified herein. Contractor shall provide equipment capable of adding measured amounts of water to the backfill and/or select backfill material to bring it to a condition within the range of the required moisture content. Contractor shall provide equipment capable of discing, aerating, and mixing the soil to ensure reasonable uniformity of moisture content throughout the fill material and to reduce the moisture content of the borrow material by air drying, if necessary. If the subgrade or lift of

earth material must be moisture conditioned before compaction, the fill material shall be sufficiently mixed or worked on the subgrade to ensure a uniform moisture content throughout the lift of material to be compacted. Materials at moisture content in excess of the specified limit shall be dried by aeration or stockpiled for drying.

5. Keep excavations dry during backfilling operations. No backfill or fill material shall be placed when free water is standing on the surface of the area where the fill is to be placed. No compaction of fill will be permitted with free water on any portion of the fill to be compacted. No fill shall be placed or compacted in a frozen condition or on top of frozen material. Any fill containing organic materials or other unacceptable material previously described shall be removed and replaced with approved fill material prior to compaction.
6. Compaction shall be performed with equipment suitable for the type of fill material being placed. Contractor shall select equipment that is capable of providing the minimum density required as specified herein. Hand operated compacting equipment shall be used within a distance of ten (10) feet from the wall of any completed below grade structure. Equipment shall be provided that is capable of compacting in restricted areas next to structures and around piping. The effectiveness of the equipment selected by Contractor shall be tested at the commencement of compacted fill Work by construction of a small section of fill within the area where fill is to be placed. If tests on this section of fill show that the specified compaction is not obtained, Contractor shall increase the amount of coverages, decrease the lift thicknesses or obtain a different type of compactor.
7. Levels of backfill against concrete walls shall not differ by more than two (2) feet on either side of walls, unless walls are adequately braced or all floor framing is in place up to and including grade level slabs. Particular care shall be taken to compact structure backfill, which will be beneath pipes, roads, or other surface construction or structures. In addition, wherever a trench passes through structure backfill, the structure backfill shall be placed and compacted to an elevation twelve (12) inches above the top of the pipe before the trench is excavated. Compacted areas, in each case, shall be adequate to support the item to be constructed or placed thereon.
8. The compaction requirements specified are predicated on the use of normal materials and compaction equipment. In order to establish criteria for the placement of a controlled fill so that it will have compressibility and strength characteristics compatible with the proposed structural loadings, a series of laboratory compaction and/or compressive strength tests shall be performed on the samples of materials submitted by Contractor. From the results of the laboratory tests, the final values of the required percent compaction, the acceptable compaction moisture content range, and the maximum permissible lift thickness will be established for the fill material and construction equipment proposed.
9. Control the water content of fill material during placement within the range necessary to obtain the compaction specified. In general, the moisture content of the fill shall be within three (3) percent of the optimum moisture content for compaction as determined by laboratory tests. Perform all necessary Work to adjust the water content of the material to within the range necessary to permit the compaction specified. Do not place fill material when free water is standing on the surface of the area where the fill is to be placed. No compaction of fill will be permitted with free water on any portion of the fill to be compacted.
10. Compact fill shall be compacted by at least two (2) coverages of all portions of the surface of each lift by compaction equipment. One (1) coverage is defined as the condition obtained when all portions of the surface of the fill material have been subjected to the direct contact of the compactor.
11. If the specified densities are not obtained because of improper control of placement or compaction procedures, or because of inadequate or improperly functioning compaction equipment, Contractor shall perform whatever Work is required to provide the required

densities. This Work shall include complete removal of unacceptable fill areas, and replacement and re-compaction until acceptable fill is provided, at no additional cost to the Owner.

12. Contractor shall repair, at his own expense, any after settlement that occurs. Contractor shall make all repairs and replacements required within 30 days after notice from Owner's Representative or Owner.

E. Backfill in Electrical Ductbank Trenches:

1. Compacted backfill shall be required for the full depth of the trench, below and above the electrical ductbank. Where the trench for one ductbank passes beneath the trench for another pipe or ductbank, select backfill shall be placed to the level of the bottom of the upper trench.
2. Placement and compaction of backfill in electrical ductbank trenches shall conform to the requirements of specified herein.

F. Backfill in Pipe Trenches:

1. Place all backfilling in pipe trenches which are below structures, other pipes, or paved areas, in horizontal layers not exceeding 6-inches in depth and thoroughly compact each before the next layer is placed. In other pipe trenches, compacted layers shall be 6-inches up to the pipe center line and 8-inches thereafter.
2. Where pipe is laid in rock excavation, crushed stone or gravel fill shall be carefully placed and tamped over the rock before the pipe is laid. Depth of crushed stone or gravel shall be at least 6-inches for pipe 24-inches and smaller and 9-inches for pipe 30-inches and larger. After laying pipe, the balance of the backfill shall be placed as described herein.
3. Prior to the installation of pipes which are to be installed in fill sections, place the fill as described herein, until a minimum height of two feet above the soffit of the pipe is reached, unless otherwise required in other Sections. The fill for the trench width shall then be excavated and the pipe installed and backfilled. The remainder of the fill shall then be placed.
4. Pipeline trenches may be backfilled prior to pressure testing, but no structure shall be constructed over any pipeline until it has been tested.
5. Unless otherwise specified, all pipe, except plastic pipe, shall be placed on a minimum 6-inch thick layer of granular embedment material. The granular embedment material shall extend 12-inches above the top of the pipe. Unless otherwise specified, CPVC, PVC, HDPE pipes and FRP ducts shall be placed on a minimum 6-inch layer of sand. Sand shall extend to 12-inches above top of pipe and to the trench walls on each side of the pipe, unless otherwise noted.
6. Embedment materials both below and above the bottom of the pipe, classes of embedment to be used, and placement and compaction of embedment materials shall conform to the following requirements:

    a. Embedment material shall be spread and the surface graded to provide a uniform and continuous support beneath the pipe at all points between bell holes or pipe joints. It will be permissible to slightly disturb the finished subgrade surface by withdrawal of pipe slings or other lifting tackle. After each pipe has been graded, aligned, placed in final position on the bedding material and shoved home, sufficient pipe embedment material shall be deposited and compacted under and around each side of the pipe and back of the bell or end thereof to hold the pipe in proper position and to maintain alignment during subsequent pipe jointing and embedment operations. Embedment material shall be deposited and compacted uniformly and simultaneously on each side of the pipe to prevent lateral displacement. The embedment material shall then be placed and compacted to an elevation 12-inches above the top of pipe.

b. Compacted backfill shall be required for the full depth of the trench above the pipe embedment material. Where the trench for one pipe passes beneath the trench for another pipe or electrical ductbank, the lower trench shall be compacted to the level of the bottom of the upper trench.
c. Each layer of embedment material shall be compacted by at least two complete coverages of all portions of the surface of each lift using approved compaction equipment. One coverage is defined as the conditions reached when all portions of the fill lift have been subjected to the direct contact of the compacting surface of the compactor.
d. The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.
e. The degree of compaction required for granular embedment is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 698.

G. Crushed Stone Placement:

1. Crushed stone shall be placed where shown to the limits shown.
2. Crushed stone shall be place in hand tamped lifts, not to exceed 6-inches.

H. Sand Placement:

1. Sand shall be placed as an envelope around PVC and CPVC pipes, FRP ducts and all pipe 2-inches and smaller. Place and compact minimum 6-inches of sand all round pipes, in 6-inch lifts, to a level 6-inches above the top of pipe.

I. Compaction Density Requirements:

1. The degree of compaction required for all types of fills shall be as listed below. Material shall be moistened or aerated as necessary to provide the moisture content that will facilitate obtaining the specified compaction.

Material Thick.(in)	Required Minimum Density- Percent Compaction (ASTM D 698)	*Maximum Uncompacted Lift (inches)
Subgrade and Subbase Fill:		
Below concrete slabs on grade	95	8
Below base of footings or mats, structural slabs and tank floors	95	8
Below asphalt concrete paving	95	12
**Backfill:		
More than five feet below final grade	100	8
Less than five feet below grade	95	8
Select Backfill:		
Below concrete slabs or mats	95	8
Below asphalt paving	100	8
Trench Backfill, below and above ductbanks	95	12
Trench Backfill above pipe	95	12
Granular Pipe Embedment Material	95	6
Sand Embedment Material	95	6

* Where applicable.

** Backfill shall not be used for support of facilities which are susceptible to damage from differential settlement of the fill section relative to walls.

All fill must be wetted and thoroughly mixed to achieve optimum moisture content, ±3%, with the following exceptions: On-site clayey soils optimum to +3%. Natural undisturbed soils or compacted soil subsequently disturbed or removed by construction operations shall be replaced with materials compacted as specified above.

2. Contractor's testing service shall perform tests required to provide data for selection of fill material and control of placement water content.
3. Field density tests, to ensure that the specified density is being obtained, shall be performed by Contractor's testing service during each day of compaction Work.
4. If the tests indicate unsatisfactory compaction, Contractor shall provide the additional compaction necessary to obtain the specified degree of compaction. All additional compaction Work shall be performed by Contractor, at no additional cost to the Owner, until the specified compaction is obtained. This Work shall include complete removal of unacceptable (as determined by the Owner's Representative) fill areas and replacement and re-compaction until acceptable fill is provided.

J. Replacement of Unacceptable Excavated Materials: In cases where over-excavation for the replacement of unacceptable soil materials is required, the excavation shall be backfilled to the required subgrade with select backfill material and thoroughly compacted as specified herein. Sides of the excavation shall be sloped in accordance to the maximum inclinations specified for each structure location.

K. Perform backfill around structures using the specified procedures, except that within ten (10) feet of foundations and underground structures, light compaction equipment shall be used, with the gross weight of the equipment not exceeding 7,000 pounds. Provide equipment that is capable of the required compaction within restricted areas next to structures and around piping.

3.10 EMBANKMENTS

A. To the maximum extent available, use excess earth obtained from structure and trench excavations for construction of embankments. Obtain additional material from borrow pits as necessary. After preparation of the embankment area, level and roll the subgrade so that surface materials of the subgrade will be compact and well bonded with the first layer of the embankment. All material deposited in embankments shall be free from rocks or stones, brush, stumps, logs, roots, debris, organic or other objectionable materials, waste, frozen materials or vegetation and other deleterious materials or unacceptable material. Construct embankments in horizontal layers not exceeding 8-inches in uncompacted thickness. Spread and level material deposited by excavating and hauling equipment prior to compaction. Thoroughly compact each layer by rolling or other method acceptable to the Owner's Representative to 95 percent of the maximum density at optimum moisture content as determined by ASTM D 1557. If the material fails to meet the density specified, compaction methods shall be altered. Wherever a trench passes through a fill or embankment, the fill or embankment material shall be placed and compacted to an elevation 24-inches above the top of the pipe before the trench is excavated.

3.11 GRADING

A. General: Uniformly grade areas within limits of grading under this Section, including adjacent transition areas. Smooth subgrade surfaces within specified tolerances, compact with uniform levels or slopes between points where elevations are shown, or between such points and existing grades.

B. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding. Finish surfaces free from irregular surface changes, and as follows:

1. Turfed Areas or Areas Covered with Gravel, Stone, Wood Chips, or Other Special Cover: Finish areas to receive topsoil or special cover to within not more than 1-inch above or below the required subgrade elevations.
2. Walks: Shape surface of areas under walks to line, grade and cross-section, with finish surface not more than 1-inch above or below the required subgrade elevation.
3. Pavements: Shape surface of areas under pavement to line, grade and cross-section, with finish surface not more than 1/2-inch above or below the required subgrade elevation.

C. Grading Surface of Fill Under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to required elevation. Provide final grades within a tolerance of 1/2-inch when tested with a ten foot straightedge.

D. Compaction:

1. After grading, compact subgrade surfaces to the depth and percentage of maximum density for each area classification.

3.12 PAVEMENT SUBBASE COURSE

A. General: Place subbase material, in layers of specified thickness, over ground surface to support pavement base course.

B. Grade Control: During construction, maintain lines and grades including crown and cross-slope of subbase course.

C. Shoulders: Place shoulders along edges of subbase course to prevent lateral movement. Construct shoulders of acceptable soil materials, placed in such quantity to compact to thickness of each subbase course layer. Compact and roll at least a 12-inch width of shoulder simultaneously with compacting and rolling of each layer of subbase course.

D. Placing: Place subbase course material on prepared subgrade in layers of uniform thickness, conforming to indicated cross-section and thickness. Maintain optimum moisture content for compacting subbase material during placement operations.

1. When a compacted subbase course is shown to be 6-inches thick or less, place material in a single layer. When shown to be more than 6-inches thick, place material in equal layers, except no single layer more than 6-inches or less than 3-inches in thickness when compacted.

3.13 DISPOSAL OF EXCAVATED MATERIALS

A. Material removed from the excavations which does not conform to the requirements for fill or is in excess of that required for backfill shall be removed from the Site by the Contractor and disposed of in compliance with ordinances, codes, laws and regulations, at no additional cost to the Owner.

3.14 RESTORING AND RESURFACING EXISTING ROADWAYS AND FACILITIES

A. Place 2 inches of temporary bituminous pavement immediately after backfilling trenches in paved roadways which are to be retained for permanent use. Maintain the surface of the paved area over the trench in good and safe condition during progress of the entire Work, and promptly fill all depressions over and adjacent to the trench caused by settlement of backfilling. The permanent replacement pavement shall be equal to that of the existing roadways, unless otherwise specified.

B. Pavement, gutters, curbs, sidewalks or roadways disturbed or damaged by Contractor's operations shall be restored by Contractor at his own expense to as good condition as they were previous to the commencement of the Work and in accordance with applicable local and state highway specifications or requirements.

3.15 PRECONSOLIDATION

A. Where shown, pre-consolidate soils prior to construction. These areas shall be brought up to finished grade a minimum of three months prior to the start of construction of the structures situated thereon. If any settlement occurs during this period, the settled area shall be promptly brought up to grade by the placement of additional fill.

B. After the topsoil has been stripped, settlement plates shall be placed where shown and specified.

C. Fill material to be placed over the preconsolidation areas and the method of placement shall be as specified herein. Should removal of 6-inches of topsoil result in a subgrade elevation below the base slab of proposed structures, the remaining topsoil and other unacceptable material shall be removed until suitable subgrade materials are exposed. The subgrade shall then be brought up to the proposed base slab elevation with special compacted fill.

D. Settlement plates for the observation of subsoil consolidation under fill loads shall be installed at the locations and furnished in accordance with the details shown. Contractor shall level the areas occupied by settlement plates so that the base of each plate will be at an elevation approximately equivalent to the average ground surface within a radius of five feet from the plate location. All small depressions in the ground surface at the plate location shall be filled with sand before seating the plate. The installed plate shall include the first five (5) foot pipe section tightly seated in the base coupling with the pipe marked at one foot intervals measured from the base of the plate. All marks on this and subsequent sections shall be painted with high visibility paint. The uppermost mark shall be permanently recorded by cutting a horizontal slot into the pipe with a hacksaw exactly five feet above the base of the plate. The installation of the settlement plate and its marking shall be approved by Owner’s Representative before placement of the 6-inch sand cover to anchor the plate, as shown. Subsequent to approval, Contractor shall establish the elevation of the base of the plate by determining the elevation of the uppermost mark on the pipe section.

E. During the filling operations, Contractor shall add five (5) foot sections of pipe to the settlement plate as required to maintain the top of the pipe above the fill surface at all times. When pipe sections are added, they shall be tightly joined and the additional section marked by painting at one foot intervals and including a hacksaw slot exactly five feet above the hacksaw slot made in the previous pipe section. The addition of all settlement plate extensions shall be approved by the Owner’s Representative before fill placement resumes in the area.

F. Contractor shall provide barricades around the settlement plate extensions to protect them from damage during construction. In the event that a plate is damaged by the construction operations, Contractor shall replace or repair it in a manner satisfactory to Owner's Representative.

G. Contractor shall measure and record the elevation of the settlement plate and the elevation of the fill surface at the plate location once each week after the plates are installed and submit this data to the Owner's Representative.

H. Do not start construction of structures situated on areas to be pre-consolidated until sufficient settlement has occurred. The degree of settlement considered sufficient shall be determined by Owner's Representative from readings of settlement plates.

I. In no case shall construction commence within three (3) months of fill placement.

J. Prior to topsoiling and seeding, the filled area shall be cut back and graded to the proper subgrade, if required.

3.16 TEMPORARY FENCING

A. Furnish and install for the safety and welfare of the general public a temporary fence surrounding excavations and work area. Fence shall have openings only at vehicular, equipment and worker access points.

B. The fence shall be a snow fence type enclosure, 48-inches high. Fence shall be constructed of vertical hardwood slats measuring 1-1/2 by 1/4-inch interwoven with strands of horizontal wire or shall be of equivalent plastic construction. Posts shall be of steel, either U, Y, T or channel section, and shall have corrugations, knobs, notches or studs placed and constructed to engage a substantial number of fence line wire in the proper position. Posts shall have tapered anchors weighing 0.67 pounds or more, each firmly attached by means of welding, riveting or clamping. Posts shall have a nominal weight of 1/3 pound per linear foot exclusive of the anchor. Each post shall be furnished with a sufficient number of galvanized wire fasteners or clamps, of not less than 0.120-inch in diameter for attaching fence wire to the post.

3.17 FIELD QUALITY CONTROL

A. Quality Control Testing During Construction: Testing service must inspect and approve subgrades and fill layers before construction Work is performed thereon. Tests of subgrades and fill layers shall be taken as follows:

1. Footing Subgrade: For each strata of soil on which footings will be placed, conduct at least one test to verify required design bearing capacities. Subsequent verification and approval of each footing subgrade may be based on a visual comparison of each subgrade with related tested strata, when acceptable to Owner's Representative.
2. Paved Areas and Building Slab Subgrade: Make at least one field density test of subgrade for every 2,000 square feet of paved area or building slab, but in no case less than three tests. In each compacted fill layer, make one field density test for every 2,000 square feet of overlaying building slab or paved area, but in no case less than three tests.
3. Foundation Wall Backfill: Take at least two field density tests, at locations and elevations as directed by the Owner's Representative.

B. If testing service reports or inspections show subgrade or fills are below specified density, provide additional compaction and testing at no additional cost to the Owner.

END OF SECTION 02315

NO TEXT THIS PAGE

SECTION 02320 – DEWATERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section provides for furnishing all permits, labor, materials, equipment, power and incidentals for performing all operations necessary to dewater, drain and maintain excavations as described herein and as necessary for installation of structures, pipelines and appurtenances. Included are installing, maintaining, operation and removing dewatering systems and other approved devices for the control of surface and groundwater during the construction of structures, pipelines and appurtenances and open cut excavations. Included also are protecting work against rising waters and repair of any resulting damage.

B. Related Sections:

1. Division 02 Sections "Excavation Support and Protection", "Sediment and Erosion Control Plan" and "Excavation and Backfill".

C. Contractor's Responsibility

1. It is the sole responsibility of the Contractor to identify groundwater conditions and to provide any and all labor, material, equipment, techniques and methods to lower, control and handle the groundwater as necessary for his construction methods and to monitor the effectiveness of this installed system and its effect on adjacent facilities.
2. Operate, maintain and modify the system(s) as required to perform the work. Upon completion of the Construction, remove the system(s), unless otherwise directed by Owner's Representative. The development, drilling and abandonment of all wells used in the dewatering system shall comply with regulations of the New York State Department of Environmental Conservation (NYSDEC) and the local municipalities.
3. Assume sole responsibility for dewatering systems and for all loss or damage resulting from partial or complete failure of protective measures and any settlement or resultant damage caused by the dewatering operation.
4. Obtain all permits associated with dewatering operations.
5. Contractor shall submit dewatering permit application to the NYSDEC within fifteen (15) days of the Project Notice to Proceed (NTP).

1.3 PERFORMANCE REQUIREMENTS

A. Design, furnish, install, test, operate, monitor, and maintain dewatering system consisting of equipment, appliances and materials designed or suitable for controlling groundwater in construction work and of sufficient scope, size, and capacity to control hydrostatic pressures and to lower, control, remove, and dispose of ground water and permit excavation and construction to proceed on dry, stable subgrades.

1. Design dewatering system, including comprehensive engineering analysis by a qualified Professional Engineer, licensed and registered in the State of New York, using performance requirements and design criteria indicated.
2. Continuously monitor and maintain dewatering operations to ensure erosion control, stability of excavations and constructed slopes, that excavation does not flood, and that damage to subgrades and permanent structures is prevented.
3. Prevent surface water from entering excavations by grading, dikes, or other means.
4. Accomplish dewatering without damaging existing buildings, structures, and site improvements adjacent to excavation.
5. When the dewatering system is no longer required and if directed by Owner's Representative, Contractor shall dismantle and remove the system in its entirety, including all appurtenances, from the site.

B. The regulatory required and approved dewatering system installed by the Contractor, shall be fully tested prior to Contractor utilization of the system and prior to commencement of any construction activity requiring use of the system.

C. The entire dewatering operation and the apparatus connected therewith must at all reasonable hours be open to inspection and to testing by regulatory agency representatives, as required.

D. Where private wells, used for water supply, have become dry or cease to produce potable water due to the dewatering operation, Contractor shall be responsible for providing the necessary water at no additional cost to the Owner.

E. All well point header and discharge lines must not remain in place beyond the period for which they are required to perform work in their immediate vicinity nor shall they be placed in advance of their use unless otherwise directed by the Owner's Representative. All dewatering systems shall be subject to review by the Owner's Representative. Installations, which fail to meet the criteria as specified herein, shall be removed and re-installed to meet the above criteria at no additional cost to the Owner.

F. All costs shall be the responsibility of the Contractor.

1.4 SUBMITTALS – FOR INFORMATION ONLY

A. Shop Drawings: For dewatering system show arrangement, locations, and details of wells and well points; cofferdams, locations of risers, headers, filters, pumps, power units, and discharge lines; means of discharge, control of sediment, disposal of water and; all pertinent data and appurtenances for a complete and fully operational dewatering system proposed for use and regulatory agency approved.

1. Include layouts of piezometers and flow-measuring devices for monitoring performance of dewatering system.
2. Include a written plan for dewatering operations including control procedures to be adopted if dewatering problems arise.

B. Delegated-Design Submittal: For dewatering system indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the licensed and registered New York State Professional Engineer responsible for their preparation.

C. Qualification Data: For qualified Installer, land surveyor and Professional Engineer.

D. Field quality-control reports.

E. Other Informational Submittals:

1. Photographs or Videotape: Show existing conditions of adjoining construction and site improvements that might be misconstrued as damage caused by dewatering operations.

F. Contractor shall submit an application to the New York State Department of Environmental Conservation for a "Dewatering and Operating Permit"

G. “Dewatering and Operating Permit” application shall be submitted within fifteen (15) days of the Project Notice to Proceed (NTP), and shall give, at a minimum, the following details in full:

1. Proposed starting date of the dewatering operation
2. Name of the licensed well driller
3. Details of the dewatering system to be installed
4. Size, number, and spacing of the well points
5. Pump capacity, pumping rate, and expected volume of water to be withdrawn
6. Amount of water table drawdown
7. Final disposition of water
8. Expected duration of the operation

H. Before any dewatering operation is to begin, approval of the “Dewatering and Operating Permit” application and all the aforementioned items is required. If any unforeseen emergency construction arises, the Contractor must notify the New York State Department of Environmental Conservation as soon as possible, that dewatering under such circumstances has been started. Notification will be made to the following:

New York State Department of Environmental Conservation
Region 1 Division of Water, Regional Headquarters
Regulatory Affairs, C/O Regional Permit Officer
50 Circle Road
Building No. 40
SUNY at Stony Brook, New York 11790-2356
Telephone: (631) 444-0405

I. Contractor shall submit a copy of the approved permit to the Owner’s Representative prior to start of work.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A licensed well drillers (in accordance with Section 15-1525 of the Environmental Conservation Law) that has specialized in design of dewatering systems and/or dewatering work and has satisfactorily completed work for a minimum of five (5) projects of comparable size within the last five (5) years.

B. Regulatory Requirements: Contractor shall be responsible for obtaining all necessary permit(s) from all applicable regulatory agencies prior to the proposed starting date of the dewatering

operation. The following details shall be provided (at a minimum): Name of the Registered Well Driller, details of the dewatering system to be installed, including size, number and spacing of the well points, pump capacity, pumping rate and expected volume of water to be withdrawn. Also to be included will be the amount of water table drawdown, the final disposition of the water and the expected duration of the operation. Before any dewatering operation is to begin, submittal to, approval and the securing of a permit is required from the NYSDEC Region 1 permit administrator. If any unforeseen emergency construction arises, the Contractor must notify the NYSDEC as soon as possible that dewatering under such circumstances has been started.

C. Contractor shall comply with hauling and disposal regulations of authorities having jurisdiction.

D. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to dewatering including, but not limited to, the following:

a. Inspection and discussion of condition of site to be dewatered including coordination with temporary erosion control measures and temporary controls and protections.
b. Geotechnical report.
c. Proposed site clearing and excavations.
d. Existing utilities and subsurface conditions.
e. Coordination for interruption, shutoff, capping, and continuation of utility services.
f. Construction schedule. Verify availability of Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
g. Testing and monitoring of dewatering system.

E. Any proposed dewatering operation must be carried out by only licensed well drillers in accordance with Section 15-1525 of the Environmental Conservation Law.

F. The entire dewatering operation and the apparatus connected therewith must at all reasonable hours be accessible to inspection and test by duly accredited representatives of the Department of Environmental Conservation.

1.6 PROJECT CONDITIONS

A. Interruption of Existing Utilities: Do not interrupt any utility serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility according to requirements indicated:

1. Notify Owning Utility, Owner’s Representative and Owner no fewer than 3 days in advance of proposed interruption of utility.
2. Do not proceed with interruption of utility without Owning Utility, Owner’s Representative and Owner written permission.

B. Project-Site Information:

1. Limited site soil boring data, samples and soil reports are available for inspection and are for informational purposes only. Any opinions expressed in these reports are those of a Geotechnical Engineer and represent interpretations of subsoil conditions, tests, and

results of analyses conducted by a Geotechnical Engineer. Owner shall not be responsible for interpretations or conclusions drawn from this data. Bidders must make their own interpretation of subsurface conditions that may affect methods or the cost of construction of the Work.

2. Contractor shall satisfy himself by actual examination of the site of the Work, as no claim shall be made by the Contractor for additional compensation by reasons of the fact that existing conditions are other than as shown of the Contract Documents.
3. Contractor, at his own expense, shall make test borings or dig test holes to locate and determine the depth to groundwater, including a determination of any seasonal variations. Any/all expenses for making test borings and/or digging test holes and other investigative work shall be borne by the Contractor.

C. Survey Work: Engage a New York State licensed and registered land surveyor or Professional Engineer to survey adjacent existing buildings, structures, and site improvements, establishing exact elevations at fixed points to act as benchmarks. Clearly identify benchmarks and record existing elevations.

1. During dewatering, regularly resurvey benchmarks, maintaining an accurate log of surveyed elevations for comparison with original elevations. Promptly notify Owner's Representative if changes in elevations occur or if cracks, sags, or other damage is evident in adjacent construction.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by dewatering operations.

1. Prevent surface water and subsurface or ground water from entering excavations, from ponding on prepared subgrades, and from flooding site and surrounding area.
2. Protect subgrades and foundation soils from softening and damage by rain or water accumulation.
3. Contractor shall maintain a careful check to detect any settlement in existing adjacent Work or existing structures. Contractor shall notify the Owner's Representative of any signs of settlement. Contractor shall establish settlement point benchmarks and take periodic readings Contractor shall take immediate action to prevent settlement and shall repair any damage caused by settlement at no additional cost.

B. Install dewatering system to ensure minimum interference with roads, streets, walks, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

C. Provide temporary grading to facilitate dewatering and control of surface water.

D. Monitor dewatering systems continuously.

E. Promptly repair damages to adjacent facilities caused by dewatering.

F. Protect and maintain temporary erosion and sedimentation controls during dewatering operations.

G. Effect of Dewatering on Private Wells

1. Contractor shall take special precautions where the removal of water may affect the production of private wells.
2. Prior to the start of any dewatering operations, Contractor shall notify in writing all owners of water supply wells in areas within or adjacent to the Contract site where his dewatering operations may affect the quality and/or pumping capacity of their wells. In addition, the Contractor shall, prior to and after construction as directed by the Owner's Representative, test the water quality and pumping capacity of each well that may be affected by his dewatering operations. Contractor shall be solely responsible for determining the extent of influence that his operations will have on existing water supply wells and in addition will be solely responsible for contacting in writing all affected well owners. If requested, Owner may assist the Contractor in notifying affected water supply well owners, but it is to be understood that the Contractor shall assume all responsibility for notification and damages and shall indemnify and hold Owner harmless from any claim from either direct or indirect damages resulting from his dewatering operation either directly or indirectly.

3.2 INSTALLATION

A. Install dewatering system utilizing wells, well points, or similar methods complete with pump equipment, standby power and pumps, filter material gradation, valves, appurtenances, water disposal, and surface-water controls.

1. Space well points or wells at intervals required to provide sufficient dewatering.
2. Use filters or other means to prevent pumping of fine sands or silts from the subsurface.

B. Before excavating below groundwater level, place system into operation to lower water to perform work in dry conditions. Operate system continuously until drains, sewers, and structures have been constructed and fill materials have been placed or until dewatering is no longer required.

C. Provide an adequate system to lower and control ground water to permit excavation, construction of structures, and placement of fill materials on dry subgrades. Install sufficient dewatering equipment to drain water-bearing strata below bottom of foundations, drains, sewers, and other excavations.

1. Open sump pumping that leads to loss of fines, soil piping, subgrade softening, and slope instability is not permitted.

D. Reduce hydrostatic head in water-bearing strata below subgrade elevations of foundations, drains, sewers, and other excavations.

1. Maintain piezometric water level a minimum of 24 inches below the deepest elevation of any required excavation. The installation shall also be free of vibration during operation.

E. When dewatering systems utilizing central pumping stations are used, these stations will be acoustically shielded from neighboring residences.

1. Contractor shall utilize sound level meters ANSI-Type II specifications for noise regulation enforcement with a measurement tolerance of +2dB.

F. Dispose of water removed by dewatering in a manner that avoids endangering public health, property, and portions of work under construction or completed. Dispose of water and sediment in a manner that avoids inconvenience to others. Provide sumps, sedimentation tanks, and other flow-control devices as required by NYSDEC and other authorities having jurisdiction.

G. Contractor shall not be permitted to dump spoil onto those areas designated as wetlands or waterways. Contractor shall not stockpile or store spoil, materials, tools or equipment on wetlands. Contractor shall not discharge groundwater directly into creeks, ponds, lakes or waterways without first obtaining approval(s) and/or proper permit(s) from all applicable regulatory agencies. Before discharge into surface waters, dewatering effluents must be filtered through hay bales or detained settling basins to avoid sedimentation to the receiving waters. If necessary, baffling devices shall be used to prevent the scouring of the bed or banks of any receiving stream.

H. Provide standby equipment on site, installed and available for immediate operation, to maintain dewatering on continuous basis if any part of system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, restore damaged structures and foundation soils at no additional expense to Owner.

I. Dewatering will continue until backfilling is completed. Provide adequate weight of backfill to prevent buoyancy of piping and structures prior to starting up equipment.

3.3 FIELD QUALITY CONTROL

A. Observation Wells: Provide, take measurements, and maintain observation wells or piezometers to monitor groundwater level. Additional observation wells may be required by authorities having jurisdiction.

1. Observe and record daily elevation of ground water and piezometric water levels in observation wells.
2. Repair or replace, within 24 hours, observation wells that become inactive, damaged, or destroyed. In areas where observation wells are not functioning properly, suspend construction activities until reliable observations can be made. Add or remove water from observation-well risers to demonstrate that observation wells are functioning properly.

B. Provide continual observation to ensure that subsurface soils are not being removed by the dewatering operation.

3.4 PERFORMANCE

A. Groundwater shall not be discharged directly into creeks, ponds, storm drains, lakes, or waterways without written permission from the proper authorities.

B. All catch basins, storm drains, or recharge basins adversely affected by the accumulation of silt resulting from dewatering operations, shall be restored by the Contractor to their original condition. This work shall be done at no additional cost to the Owner.

C. The use of dewatering system utilizing central pumping stations and header or discharge lines which remain in place at one location for more than six (6) weeks shall not be permitted unless approved in writing by the Owner's Representative. All well point header and discharge lines must not remain in place beyond the period for which they are required to perform work in their immediate vicinity, nor shall they be placed far in advance of their use.

D All dewatering pumps shall be acoustically shielded from neighboring residences. Styrofoam or other sound absorbing material shall be used on the inside of the enclosure surrounding the pump. The installation shall also be free of vibration during operation.

E. Noise levels for dewatering pumps measured at a distance of twenty-five (25) feet or at the property line, whichever is closer, from the pumps shall not exceed sixty (60) decibels.

F. Where private wells, used for water supply, have become dry or cease to produce potable water, the Contractor shall be required to maintain continuous water service to the homes and buildings affected by the dewatering. In order to maintain continuous service, the Contractor may elect to deepen existing wells or install new wells where deepening is not practical. In all cases these wells shall extend to a depth below the drawdown caused by the dewatering operations.

G. Any method of dewatering excavations which does not satisfactorily fulfill and maintain the desired water elevation shall be discontinued and a method of dewatering which will produce the required results shall be substituted. Water shall not be allowed to rise over concrete until it has set and attained sufficient strength, or around pipes or other structures, where it might cause damage to the work.

H. Contractor shall conduct his operations so that drainage from his work will not be directed to or interfere with the construction operations of any other Contractor.

I. At major intersections and where directed by the Owner's Representative, the Contractor shall bury the header and/or discharge pipes.

J. Observation type well points shall be installed and maintained as directed by the Owner's Representative. These observation wells shall be of similar construction as standard well points and shall be fitted with a tee, plug and valve so that water levels can be read. All observation wells shall be properly numbered by contract number and observation point numbers.

K. Contractor shall submit to the Owner's Representative prior to starting his dewatering pumps, a record of each observation well including well number, location, depth of water to existing ground surface and all other information as required by the Owner's Representative. These observation wells shall be left in place until the adjacent sewer line or force main has passed the final leakage test. The observation well points shall be pulled and removed after the Final Leakage Test.

L. Dewatering system shall be designed so as to avoid settlement or damage to existing structures and utilities.

3.5 REPAIR OF DAMAGE

A. Contractor shall assume full responsibility for all loss and damage due to flooding, rising water or seepage resulting from dewatering operations in any part of the Work. Repair any damage to partially completed Work from these or other causes, including the removal of slides, repair of foundation beds and performance of any other work necessitated by lack of adequate dewatering or excessive dewatering.

3.6 REMOVAL

A. When the dewatering system is no longer required and if directed by Owner's Representative, Contractor shall dismantle and remove the system and all appurtenances from the site in accordance with requirement of NYSDEC and Owner's Representative. Plug or fill well holes with sand or cut off and cap wells a minimum of 36 inches below overlying construction.

END OF SECTION 02240

NO TEXT THIS PAGE

SECTION 02512 - ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.1 SCOPE

A. Asphaltic concrete paving shall include tack coat, binder and wearing courses and asphalt crack/joint filler as specified herein.

B. Asphalt crack/joint filler shall be utilized to seal the interface between cut existing asphalt and new/permanent asphalt and shall be provided within 5-days following permanent paving restoration.

C. Permanent pavement markings shall be provided within 5-days following permanent paving restoration. Permanent pavement markings shall be thermoplastic reflectorized type conforming to the New York State Department of Transportation, Design and Construction Division, Standard Specifications, Construction and Materials, latest revision and as specified on the Drawings.

1.2 RELATED SECTIONS

A. Section 02721 - Recycled Concrete Aggregate (RCA) Base Course.

1.3 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.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

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.

1.5 QUALITY ASSURANCE

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

B. Obtain materials from the same supplier throughout the duration of the project.

C. Do not alter from mix design requirements.

1.6 DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products to the site under provisions of Sections 01651 and 01661.

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.

1.7 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

2.1 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.

E. Asphalt crack/joint filler: A/C Kit Zeco AA-1071 blown asphalt formulated to meet NYSDOT Specification Section 702-0700.

2.2 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.

2.3 ACCESSORIES

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

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

2.4 MIXES

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

B. Binder Course: NYSDOT Type 3; 4.5 to 6.5 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing
1-1/2 inches	100
1 inch	95-100
1/2 inch	70-90
1/4 inch	48-74
1/8 inch	32-62
No. 20	15-39
No. 40	8-27
No. 80	4-16
No. 200	2-8

C. Wearing Course: NYSDOT Type 6F; 5.8 to 7.0 percent of asphalt cement by weight in mixture in accordance with the following gradation:

Sieve Size	Percent Passing
1 inch	100
1/2 inch	90-100
1/4 inch	65-85
1/8 inch	36-65
No. 20	15-39
No. 40	8-27
No. 80	4-16
No. 200	3-6

2.5 SOURCE QUALITY CONTROL

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

B. Provide asphalt in accordance with the approved mix design for each type of asphalt.

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

PART 3 - EXECUTION

3.1 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.

3.2 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.

3.3 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.

G. Hand compact in areas inaccessible to rolling equipment.

H. Compact pavement to a minimum of 94 percent maximum density.

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

3.4 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: ¼ inch.

3.5 FIELD QUALITY CONTROL

A. Field inspection and testing will be performed under provisions of Section 01400.

B. Take samples and perform tests in accordance with Section 01400.

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

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

3.6 PROTECTION

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

3.7 WARRANTY

A. The equipment materials and products furnished under this section shall be guaranteed for a period of one (1) year from the date the equipment was placed into problem free operation against defective materials, designs and workmanship. Upon receipt of notice from Owner of failure of any part of the equipment, material or product during the guarantee period, the affected equipment, material or product shall be replaced or repaired promptly by and at the expense of the Contractor.

END OF SECTION 02512

NO TEXT THIS PAGE

SECTION 02575 – PAVEMENT MILLING

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Pavement profiling and milling of existing pavements in preparation for the placement of an asphalt wearing course.

B. Disposal of pavement removed during milling process.

1.2 RELATED SECTIONS

A. Section 02512 - Asphaltic Concrete Paving: Placing an asphalt wearing course.

1.3 SYSTEM DESCRIPTION

A. The final milled surface depth below proposed finished grade shall be as specified in the Contract Documents.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Provide data on milling equipment.

C. Shop Drawings: Indicate method of milling or profiling and details of stringline reference system.

D. Identify location, Part 360 Permit Number and contract information of construction and demolition (C&D) debris processing facility that will receive the millings.

1.5 PRECONSTRUCTION CONFERENCE

A. Convene one (1) week prior to commencing work of this section.

B. Verify with Owner’s Representative limits and locations of milling.

1.6 COORDINATION

A. Coordinate milling process with all asphalt placement and patching.

PART 2 - PRODUCTS

2.1 EQUIPMENT

A. Pavement Profiler: Self-propelled planing, grinding or cutting machine with sufficient power, traction and stability to maintain accurate depth of cut and slope; equipped with automatic grade and slope controls capable of producing a finished profile within 0.02 foot and equipped with an integral loader to remove milled material; integral dust controller; capable of cutting daylight while maintaining desired profile; capable of accurately establishing profile grades by

referencing from the existing pavement or from an independent grade control and shall have positive means for controlling cross slope; heating devices for pavement will not be permitted.

B. Cold milled material shall be milled to provide a nominal one-inch maximum size.

C. Machine shall be capable of tilting to allow feathering of edges to zero cut.

2.2 ACCESSORIES

A. String Line: Suitable wire and support devices compatible with the pavement profiler to control grade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify existing substrate and conditions.

B. Verify actual areas to be milled with Owner's Representative. Report any major discrepancies immediately to the Owner's Representative.

3.2 PREPARATION

A. Place stringline reference system adjacent to pavement to be milled and support wire at maximum intervals of 25 feet.

B. Provide tension in the wire to prevent sag greater than ¼".

3.3 APPLICATION

A. Mill and profile the pavement to the limits and dimensions, as specified and as directed by Owner's Representative.

B. Mill around all manhole covers, grates, valves and castings. Exercise care not to damage these items.

C. Vacuum trucks, street sweepers or power brooms shall be used to clean the milled surfaces. The Owner's Representative may disallow the use of a power brooms in urban, residential or other sensitive areas, if dust raised by broom is deemed by the Owner's Representative to be objectionable and unacceptable.

D. Remove and dispose of all material removed during the milling process.

E. Area not accessible to the milling machine, such as around and/or adjacent to inlets, manholes, curbs and transverse joints on structures, may be removed by a small milling machine, handwork or other methods approved by the Owner's Representative.

F. In the event the entire pavement width has not been milled to a flush surface by the end of a work period resulting in a vertical or near vertical longitudinal face exceeding 2 inches in height, this longitudinal face shall be sloped in a manner acceptable to the Owner's Representative so as not to create a hazard to traffic during periods when construction is not in progress. Transverse

faces that are present at the end of a working period shall be tapered in a manner approved by the Owner's Representative.

G. Maintain drainage at storm drainage inlets at all times.

3.4 TOLERANCES

A. Maximum variation above proposed finished milled grade: 1/8"

B. Maximum variation below proposed finished milled grade: ¼"

3.5 ADJUSTING

A. Surfaces of milled areas which do not fall within the aforementioned tolerances shall be corrected at no additional cost to the Owner as follows:

1. Elevation too high: Mill to proposed grade.
2. Elevation too low: Place asphalt truing and leveling.

3.6 CLEANING

A. Dust free surface shall result from the cleaning.

B. Milled and adjacent surfaces shall be cleaned again, as directed by the Owner's Representative, prior to the placement of tack coats, or pavement courses if traffic has been allowed on the milled surface and/or if more than 48 hours have elapsed since initial cleaning.

END OF SECTION 02575

NO TEXT THIS PAGE

SECTION 02576 – TEMPORARY PAVEMENT

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish, install as maintain temporary pavement. In addition, any existing pavement damaged by the Contractor outside the removal limits shown on the Drawings shall be removed and replaced, as directed by the Owner's Representative.
2. The Work includes temporary pavements comprised of one or more of the following:

a. RCA binder courses.
b. Temporary pavement marking.

B. Related Sections:

1. Section 02315, Excavation and Backfill.
2. Section 02512, Asphaltic Concrete Paving.
3. Section 02721, Recycled Concrete Aggregate (RCA) Base Course.

1.2 QUALITY ASSURANCE

A. Plant Inspection: All bituminous mixes may be subject to inspection, testing and approval by the Owner. Contractor and plant personnel shall furnish all necessary assistance and cooperation.

B. Laboratory Approval: Laboratory approval of the sources of supply of the fine aggregates, coarse aggregates, mineral filler, bituminous materials, liquefiers and any other materials used in the mix shall be obtained and submitted by the Contractor. No delivery or mixed materials shall be made from any bituminous mixing plant until the source of supply are approved.

C. Testing Services:

1. General: Testing of materials for compliance with technical requirements of the Specifications shall be the duty of the testing laboratory.
2. Testing Services: The testing laboratory will:

a. Test the Contractor's proposed materials in the laboratory and field for compliance with the Specifications.
b. Report all test results to the Owner's Representative and the Contractor.

D. Reference Standards: Comply with the applicable provisions and recommendations of the following, unless otherwise shown or specified.

1. RCA and Asphalt Binder Courses of the Suffolk County Department of Public Works (SCDPW) Construction Specifications for the Construction of Highways, or as currently amended.

1.3 SUBMITTALS

A. Samples: If requested, submit for approval the following:

1. At least two weeks prior to the date of anticipated use, the Contractor shall submit to the Owner for approval, a representative sample of materials for temporary pavement.
2. Contractor shall notify the Owner in writing of the location and source of each sample.

B. Shop Drawings: Submit for approval the following:

1. Job mix formula proposed, giving complete data on materials, including source, location, percentages, temperatures, date of last testing, and all other pertinent data.

1.4 JOB CONDITIONS

A. Weather Limitations:

1. Bituminous pavement for temporary uses that are not and will not become part of a permanent pavement shall not be laid on a frozen subgrade.

B. Grade Control: Establish and maintain the required lines and grades, including crown and cross-slope during construction operations.

C. Installed temporary pavement shall not exceed 1,000 continuous linear feet. Temporary pavement shall be removed and replaced by permanent pavement if in excess of 1,000 continuous linear feet. Contractor can continue to install pipe, however, if more than 60 feet of additional pipe is installed before beginning the removal of temporary pavement and installation of permanent trench restoration on the previous pipe runs a stop work order will be issued by the Owner. If multiple crews are utilized, each crew shall be held to this installed distance before permanent paving must be completed.

PART 2 – PRODUCTS

2.1 PAVEMENT THICKNESS

A. In-place compacted material thickness shall not be less than two (2”) compacted thickness.

2.2 MATERIALS

A. Materials shall conform to the following:

1. Pavement: Provide temporary pavement, consisting of RCA and binder courses conforming to the Suffolk County Department of Public Works (SCDPW) Construction Specifications for the Construction of Highways, or as currently amended.
2. Pavement Markings: Provide temporary pavement markings within 5-days of temporary pavement installation. Temporary pavement markings shall be reflectorized epoxy paint conforming to the New York State Department of Transportation, Design and Construction Division, Standard Specifications, Construction and Materials, latest revision and as specified on the Drawings.

PART 3 - EXECUTION

3.1 GENERAL

A. Installation of all pavement materials and pavement markings shall be performed by experienced personnel.

B. Preparing the mixtures, paving equipment, placing the mixes, and compacting the mixes shall be in accordance with the County Standard Specification.

1. Preparing the mixtures includes the plant equipment, stockpiling, heating, aggregate processing, mixing of aggregate and bituminous material, and transportation to job site.
2. Paving equipment includes bituminous pavers, rolling equipment and hand tools.
3. Placing the mixes includes paver-placing, hand placing, spreading, tamping and jointing.
4. Compacting the mixes includes breakdown rolling, second rolling and finish rolling.

C. Contractor shall insure that all castings are set flush with the road surface. Contractor is advised that there shall be no placement of bituminous concrete until:

1. Curbs, gutter aprons, driveway aprons, surface inlets, catch basins, and manholes have been constructed to their final elevation.

D. Provide final surfaces of uniform texture, conforming to required grades and cross sections.

E. Repair holes from test specimens as specified for patching defective work.

F. Contractor shall provide all labor, equipment and materials required to provide a drainage system for temporary access roads to facilities under construction.

3.2 SUBGRADE PREPARATION

A. Subgrade shall be compacted with a ten-ton roller or other approved method.

B. No materials shall be placed on subgrades which are muddy or have water thereon.

3.3 TEMPORARY PAVEMENT OVER TRENCHES

A. Bituminous concrete plant mix to be utilized for temporary pavement over trenches, as required, shall conform to the requirements of Suffolk County Department of Public Works (SCDPW) Construction Specifications for the Construction of Highways, or as currently amended.

B. Trenches for utility work within existing paved areas shall receive temporary pavement as directed by the Owner and/or Owner's Representative and/or as specified on the contract drawings. Temporary pavement shall be furnished, installed and maintained by Contractor. The Owner and/or Owner's Representative shall determine the limits of temporary pavement to be installed over these trenches. In any event, temporary pavement shall not exceed 1,000 continuous linear feet. Temporary pavement shall be

removed and replaced by permanent pavement if in excess of 1,000 continuous linear feet. Contractor can continue to install pipe, however, if more than 60 feet of additional pipe is installed before beginning the removal of temporary pavement and installation of permanent trench restoration on the previous pipe runs a stop work order will be issued by the Owner. If multiple crews are utilized, each crew shall be held to this installed distance before permanent paving must be completed

C. After the trench has been properly backfilled, excavation shall be made over the trench area and the sub-grade compacted by rolling with a ten ton roller or other approved methods, so as to permit the placing of a two (2") compacted thickness of bituminous concrete. The sub-grade shall not be in a muddy or frozen condition and shall be smooth and parallel to the desired surface of the finished pavement. Compaction of this 2" minimum thickness bituminous concrete shall be as specified herein.

3.4 PATCHING

A. Remove and replace all defective areas. Cutout such areas and fill with fresh bituminous concrete as specified in the Suffolk County Department of Public Works (SCDPW) Construction Specifications for the Construction of Highways, or as currently amended. Compact to the required density.

3.8 CLEANING AND PROTECTION

A. After completion of paving operations, clean surfaces of excess or spilled bituminous materials and all foreign matter.

B. Protect newly finished temporary pavement until it has become properly hardened by cooling.

C. During the paving operation cover openings of drainage structures in the area of paving.

3.9 MAINTENANCE AND ACCEPTANCE

A. Contractor shall maintain all paved surfaces until the roads and parking areas have been accepted. Paved areas will not be accepted until after the Contractor has completed all phases of the work, including all necessary transportation, hauling and severe usage of the paved areas. The Owner's Representative shall be the sole judge in this matter.

END OF SECTION 02576

SECTION 02580 - SANITARY MANHOLES, FRAMES AND COVERS

PART 1 - GENERAL

1.1 SUMMARY

A. Contractor shall provide all labor, materials, tools, equipment and accessories as may be required to furnish and install precast concrete sanitary manholes, frames and covers at the locations as shown in the Contract Documents, as recommended by the supplier, and in compliance with all local and state building codes and regulations, and standards of the Suffolk County Department of Public Works (SCDPW).

B. The precast concrete manhole manufacturer shall be responsible for the design of all elements required for the support and erection of precast sanitary manhole.

C. The design of all members and elements shown in the Contract Documents are for “in place” completed structures. All construction loading criteria and verification of design for the construction loading such as stripping, handling, transportation and erection are the sole responsibility of the precast concrete manhole manufacturer.

D. The precast concrete manhole manufacturer shall provide and coordinate the location of embedded items in cast-in-place concrete or connections to supporting structures required for precast connections with the Contractor for the elements to be attached. The precast concrete manhole manufacturer shall provide templates to the Contractor for placing anchorages in cast-in-place foundation work.

1.2 REFERENCES

A. American Concrete Institute (A.C.I.) 318, latest revision: Building Code Requirements for Reinforced Concrete.

B. ASTM C32, Grade MS.

1.3 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Section 02250 – Excavation Support and Protection

C. Section 02315 - Excavation and Backfill

D. Section 03300 – Cast-in-Place Concrete

E. Section 07160 - Bituminous Dampproofing

F. Section 15064 – Plastic Pipe and Fittings

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. Obtain necessary permits from local Authorities. Ascertain and comply with local requirements for materials, construction and restoration of pavement.

1.5 QUALITY ASSURANCE

A. General

1. Owner reserves the right to inspect and test all precast concrete manhole components, accessories, and joint material upon delivery to the site and/or at the point of manufacture.
2. All precast concrete manhole sections delivered to the job site shall be clearly marked at the factory with the date of manufacture and the manufacturer's identification. Omission of this information may be cause for rejection of the manhole sections.
3. Owner reserves the right at all times to have its representative inspect the materials, the processes of manufacture, the records of analysis and tests, and to select the test specimens at the place of manufacture of the precast manhole sections.
4. Manufacturer must give the Owner ten (10) days notice prior to the commencement of any manufacturing process or testing of precast manhole sections.
5. Contractor shall conduct leakage tests in accordance with the requirements specified in Section 02585, "Leakage Tests" of these Specifications.
6. Manhole components shall not be shipped prior to attaining the specified twenty-eight (28) day, 4,000 psi strength.
7. Certified copies of the results of all tests shall accompany each shipment of precast manhole sections and shall be furnished to the Owner with each shipment.

1.6 SUBMITTALS

A. Shop Drawings

1. Shop drawings shall be submitted for all manholes, manhole castings, and manhole accessories.
2. Shop drawings shall include, but not be limited to, the following information:

    a. Size and spacing of steel reinforcement.
    b. Wall and slab thicknesses.
    c. Concrete cover over steel reinforcement.
    d. Joint design between component manhole sections, show all dimensions.
    e. Concrete mix design including design compressive strength.
    f. Design of flexible manhole seal assemblies.
    g. Details of manhole ladders, attachments and supports.

B. Design Calculations

1. Design calculations, conforming to the applicable requirements of the American Concrete Institute Standard ACI318-89, shall be submitted by the Contractor to verify that all components of the manhole will have the required strength to withstand the following loadings:

    a. All manholes shall be of sufficient strength to withstand a minimum load produced by the prevailing earth pressure plus hydrostatic pressure in areas subject to ground water.

b. The maximum Live Load produced by H20-44 Loading as stipulated in the American Association of State Highway Transportation Officials (AASHTO).

2. All manholes in areas of high ground water or affected by tidal conditions shall be designed with a factor of safety of 1.25 against uplift.
3. All calculations shall be certified by a licensed Professional Engineer registered in the State of New York.

C. Owner's Representative review of precast shop drawings and calculations shall be for general conformance with the intent of the Contract Documents and for compatibility with the remainder of the structural design. Responsibility for the correctness of precast elements and their connections remain the responsibility of the precast concrete manhole manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Precast concrete manholes shall be loaded, transported and unloaded by methods that will prevent damage.

B. Precast concrete manholes shall be stored on firm surfaces off the ground. Support precast items at points comparable to design support conditions. Stockpiling of precast manholes will only be permitted in areas approved by the Owner's Representative.

C. Precast concrete manholes shall be handled, lifted and/or supported at points shown on the approved shop drawings or at supporting points at which the Work will set when in service. Such supporting points shall insure against any detrimental deflection, overstressing and cracking or chipping of concrete.

PART 2 - PRODUCTS

2.1 MANHOLE COLLARS

A. General:

1. Brick masonry shall meet the requirements of ASTM C32, Grade MS and shall be installed between the precast concrete manhole top slab and the manhole casting as shown in the Contract Documents in order to set the manhole casting at the proper grade. Brick masonry shall also be utilized to close up openings in manhole walls where future pipe connections are proposed. The elevation and location of such bricked up openings shall be as shown in the Contract Documents and/or as directed by the Owner's Representative.
2. Precast concrete collar rings may be substituted for brick masonry subject to shop drawing submittal and approval.

2.2 STEEL REINFORCEMENT

A. Steel reinforcement shall be placed in the various sections of precast and cast-in-place manholes as shown in the Contract Documents and/or as specified herein. All steel reinforcement shall meet the requirements specified in Section 03300, "Cast in Place Concrete".

2.3 PRECAST CONCRETE TOP SLABS AND TRANSITION SLABS

A. The precast reinforced concrete top slab placed on the top of the manhole chimney and the precast concrete transition slab used between precast manhole sections of different diameters shall be manufactured as shown in the Contract Documents. The concrete used in the manufacturer of these slabs shall be minimum 4,000 psi concrete as specified under Section 03300, "Cast in Place Concrete" of these Specifications.

2.4 CAST-IN-PLACE MANHOLE BASE

A. Cast-in-place reinforced concrete manhole bases shall be constructed as specified in the Contract Documents and/or as directed by the Owner's Representative.

B. The cast-in-place manhole base, including the invert fill, shall be constructed with 4,000 psi concrete as specified in Section 03300, "Cast-In-Place Concrete."

C. The top portion of the cast-in-place manhole base shall be formed as specified in the Contract Documents in order to accommodate the spigot end of the forty-eight (48) inch diameter precast concrete chimney. The joint between the cast-in-place manhole base and the precast concrete chimney shall be made watertight with a round "O" ring rubber gasket or with a preformed plastic sealing compound as specified in the Federal Specification SS-S-21OA in the same manner as joints between separate sections of the precast concrete chimney.

D. Pipe Connections

1. The manhole base shall be provided with circular openings at the locations and elevations for the proper connection of pipes. The pipe connections shall be sealed with flexible manhole seal assemblies.
2. The flexible manhole seal assemblies shall be installed in accordance with the recommendations of the seal assembly manufacturer and shall conform to ASTM C923-79.
3. Flexible manhole seal assemblies shall permit at least an eight (8) degrees deflection from the center line of the opening in any direction while maintaining a watertight connection.
4. The flexible manhole seal assemblies shall be as manufactured by Interpace Corp. (Lock Joint Flexible Manhole sleeve), National Pollution Control Systems, Inc. (Kor-N-Seal) or Press-Seal Gasket Corp. or equal.
5. Where PVC sewer pipe is connected to manholes and mortar or grout is used to seal the pipe connection, flexible PVC or rubber manhole water stop gaskets shall be used over the pipe end. The gaskets shall be installed in accordance with the manufacturer's recommendations. The flexible water stop gaskets shall be as manufactured by Fernco, Hamilton-Kent or equal.

2.5 CASTINGS

A. All sewer castings shall conform to the requirements specified herein and to the following standards:

Gray Iron	ASTM A48
Malleable Iron	ASTM A47
Carbon Steel	ASTM A27

Alloy Steel	ASTM A148
Aluminum	ASTM B85
Low Alloy Steel	ASTM A242

B. All sewer and manhole castings shall conform to the requirements of AASHTO M306 Loading.

C. All castings shall be free from pouring faults, cracks, blow holes, or other defects affecting their strength and value for the service intended.

D. Unless otherwise specified, gray iron shall be Class 30, malleable iron shall be Grade 32510, and carbon steel shall be Grade 65-35. Castings shall be manufactured using tough, close grained material without the admixture of cinder iron or metal of inferior quality.

1. Angles shall be boldly filleted and arises kept sharp and perfect.

E. No plugging of defective castings will be permitted.

F. The dimensions of all castings shall have a tolerance of plus or minus one-sixteenth (1/16) of an inch and an additional tolerance of plus or minimum one-sixteenth (1/16) of an inch per foot of dimension. The weight deviation tolerance shall not exceed five (5) percent. Notwithstanding the above tolerances, all manhole rings and covers of the same nominal size shall assemble interchangeable. All horizontal bearing surfaces between frames, filler rings and covers shall be machined.

2.6 MANHOLE CASTINGS

A. Adjustable Castings

1. Adjustable manhole castings shall consist of an outer frame, inner frame, cover, and a one-piece adjustment or filler ring. Filler rings may have a single slot cut into the circumference. Filler rings consisting of more than one piece are not acceptable. Castings shall be as manufactured by East Jordon Ironworks, East Jordon, MI, or approved equal. The flat exposed surface of the inner frame shall have a recessed pocket with the letters "ADJ.". The top of the lettering shall be flush with the top of the frame.

B. Adjustable Castings with Locking Covers

1. Adjustable castings with locking covers shall be furnished with gravity action lever locking devices. The units shall be as manufactured by East Jordon Ironworks, East Jordon, MI, Campbell Foundry, Harrison, NJ, or approved equal.
2. Contractor shall supply to the Owner five (5) keys for each locking cover installed, up to a limit of twenty-five (25) keys.

C. Watertight Castings

1. Watertight castings shall be of the non-adjustable type, and shall be as manufactured by East Jordon Ironworks, East Jordon, MI, or approved equal.
2. Each watertight casting shall consist of a frame, cover, steel pan, steel locking bar, brass bolt, and rubber gasket.
3. Castings to conform to those shown on Suffolk County Department of Public Works Sanitary Standard Details.

2.7 BRICK MASONRY

A. Brick Units

1. Brick shall be whole, free from cracks or other defects (chipped) etc., sound, hard burned, give a clear ringing sound when struck together, and are uniform in quality.
2. Brick shall meet the requirements of ASTM C32 Grade MS.

2.8 MORTAR FOR BRICK

A. Mortar shall be one (1) part Portland cement, ¼ to ½ parts hydrated lime or lime putty, and three (3) parts sand.

B. Portland cement shall conform to the requirements of ASTM C-150, Type II cement except where Type III cement is specified.

C. Lime shall conform to the requirements of ASTM C-207, Type S.

D. Sand shall conform to the requirements of ASTM C144 and meet the gradation requirements specified in Table 1:

TABLE 1	
Sieve Size	Percent Passing By Weight
No. 4	100
No. 8	95-100
No 50	10-40
No. 100	0-15

E. Water shall be clean and free from injurious impurities and of potable quality.

PART 3 - EXECUTION

3.1 INSTALLAION

A. Manhole Base

1. For precast manhole bases, the area underneath the manhole base shall be excavated to the required elevation. The soil below the base shall not be disturbed. The manhole base shall then be lowered into the excavation and checked for proper bearing on the subgrade, proper elevation and orientation to receive the incoming and outgoing piping at the designated invert elevation(s). If the invert elevation varies by more than plus or minus one-half (½) inch from the designated invert elevation, the base shall be removed and reset.
2. In the case of the cast-in-place manhole base, this base shall be poured in place and at an elevation to suit the incoming and outgoing connections and shall conform to the details shown in the Contract Documents.
3. Concrete invert fill shall be installed following the connection of all sewer pipes to the manhole. The invert fill shall be true to the sewer pipe invert elevations, with smooth

channels of uniform cross section and slope, either straight or with a continuous curve between inlet and outlet of pipes.

4. Concrete invert fill shall be placed in accordance with dimensions and details shown in the Contract Documents. Maximum allowable free fall of sewage shall not exceed fifteen (15) inches.
5. To eliminate free fall conditions in a manhole resulting from invert elevation differentials between incoming and outgoing pipes, Contractor shall form and construct suitable channels in the bottom of the manhole connecting the inverts.

B. Precast Concrete Top Slab and Transition Slab

1. Precast concrete top slabs and transition slabs shall be constructed and installed as specified herein and as specified in the Contract Documents.

C. Joints Between Manhole Sections

1. All joints between the various manhole sections, including cast-in-place and precast base sections, transition slabs, chimneys and top slabs, shall be made with a bell and spigot configuration with a preformed plastic sealing compound as specified in the Federal Specification SS-S-21OA.

D. Manhole Collars

1. The brick masonry or precast concrete collar shall be constructed on the Precast Concrete Top Slab to bring the manhole frame and cover to the proper grade. The minimum height shall be four (4) inches and the maximum height shall not exceed eighteen (18) inches.
2. Following the placement of the brickwork, a one-half (1/2) inch layer of Portland cement plaster shall be applied to the exterior surface of the brick and trowel led to a smooth finish.

E. Castings

1. Manhole castings shall be set in a bed of Portland cement mortar on masonry collars as specified in the Contract Documents. The rim elevation shall be as specified and/or as directed by the Owner's Representative.

3.2 CONNECTION TO EXISTING SEWER MANHOLES

A. Where required to connect a new sewer pipe to an existing sewer manhole, Contractor shall remove the bulkhead, or cut new openings in the manhole, place the pipe to the inside face of the manhole and provide a flexible watertight seal around the pipe.

B. When connections are to be made to an existing manhole without a formed invert, Contractor shall form and construct a poured invert. When connections to an existing manhole require that the existing invert be modified, Contractor shall reshape existing invert as specified in the Contract Documents and/or as directed by the Owner's Representative.

3.3 CASTING REPARATION

A. All castings shall have a full, firm, and even bearing on the supporting surface. Manhole castings shall be set on a mortar bed.

B. Castings shall be erected to accurate grades and alignment, and when placed in concrete, shall be carefully supported to prevent movement.

3.4 CASTING INSTALLATION

A. Manhole Castings

1. Before placing an adjustable manhole casting, the filler ring shall be removed. Castings shall be placed on brickwork as specified herein. Adjustable castings shall be set flush with the base pavement and shall be raised to grade immediately before placing the wearing course. Only the castings in the area that can be paved in one (1) day shall be raised. All other castings shall be set flush with the finished grade.

3.5 MASONRY PREPARATION

A. General

1. Mortar and plaster shall be mixed in a mechanically operated batch mixer of the drum type. Hand mixing will be permitted provided the quantities of materials and water are accurately measured and provided that the method of mixing is approved by the Owner's Representative. Thoroughly mix cement, lime, and sand, then add water and mix for at least four (4) minutes. Do not use mortar that has obtained its initial set or has been mixed for longer than forty-five (45) minutes.
2. All bricks shall be wetted before lying.

3.6 MASONRY INSTALLATION

A. General

1. Contractor shall cover completed work each day to prevent any precipitation from penetrating the mortar of upper courses. Do not uncover until immediately before new work is to be laid. Protect new masonry for a period of not less than seventy-two (72) hours immediately following lying. This time period may be extended by the Owner's Representative.
2. Masonry shall not be laid when the air temperature is below 40 degrees Fahrenheit on a falling thermometer, or when it appears probable that temperatures below 40 degrees Fahrenheit will be encountered before the mortar has set, unless adequate means approved by the Owner's Representative are provided for protecting the work from freezing. Masonry work may be started at thirty-four (34) degrees Fahrenheit on a rising thermometer, with the approval of the Owner's Representative. When the temperature reaches or is above forty (40) degrees Fahrenheit, proceed as under warm weather conditions. During hot weather, masonry shall be protected from direct rays of the sun.

END OF SECTION 02580

SECTION 02721 - RECYCLED CONCRETE AGGREGATE (RCA) BASE COURSE

PART 1 - GENERAL

1.1 SECTION INCLUDES

A. Recycled concrete aggregate base course.

1.2 RELATED SECTIONS

A. Section 02315 - Excavation and Backfilling

B. Section 02512 - Asphaltic Concrete Paving

C. Section 02576 - Temporary Pavement

1.3 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.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300 - Shop Drawing Procedures.

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

1.5 DELIVERY, STORAGE AND HANDLING

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aggregate Base Course: Angular, crushed, recycled concrete; free of shale, clay, friable materials and debris; graded in accordance with ANSI/ASTM C136 within the following limits:

Sieve Size	Percent Passing

1-1/2 inches	100
1 inch	90-100
1/2 inch	65-85
3/8 inch	55-75
No. 4	40-55
No. 8	30-45
No. 16	22-36
No. 30	16-27
No. 40	12-19
No. 100	7-13
No. 200	3-7

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

3.1 EXAMINATION

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

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

3.2 PREPARATION

A. Fine grade and compact subgrade to 95 percent maximum dry density in accordance with ANSI /ASTM D1557 or ASTM D2922.

3.3 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 145 lbs/cf dry density when compacted in accordance with ANSI/ASTM D1557 or ASTM D2922.

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.

3.4 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: ¼ inch.

3.5 FIELD QUALITY CONTROL

A. Field quality control laboratory tests shall be included in the Contractor's bid price 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 01400.

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 1,500 sf immediately prior to paving.

END OF SECTION 02721

NO TEXT THIS PAGE

SECTION 02770 – CONCRETE CURBS, GUTTERS, AND SIDEWALKS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install concrete curbs, gutters, and sidewalks. Any curb, curb and gutter and driveway apron which is damaged or destroyed by the Contractor outside the line of work shall be removed and replaced by the Contractor at no expense to the Owner.
2. Types of Work covered by this section are as follows:

    a. Conventionally-formed or machine-formed curb.
    b. Conventionally-formed or machine-formed curb and gutter.
    c. Conventionally-formed or machine-formed curb and sidewalk.
    d. Conventionally-formed or machine-formed curb, gutter, and sidewalk.

3. Width, thickness, geometry, and extent of curb, gutter, and sidewalk shall be as shown or indicated on the Drawings.

B. Related Sections:

1. Section 03300, Cast-In-Place Concrete.

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASTM D6690, Specification for Joint and Crack Sealants, Hot Applied for Concrete and Asphalt Pavements.

1.3 QUALITY ASSURANCE

A. Qualifications:

1. Installer: Minimum of five (5) years experience installing concrete curbs, gutters, and sidewalks.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data:

    a. Concrete and Aggregate: Supplier's technical information for materials proposed for use.
    b. Reinforcing Steel: Submit fabricator's technical information for materials proposed for use, sufficient for Owner's Representative to verify conformance to the Contract Documents.
    c. Sealant: Manufacturer's product data, brochure, and specifications for product proposed for use.

B. Informational Submittals: Submit the following:

1. Certifications:

a. Provide as required in concrete sections referred to in the section.
b. Sealant: Manufacturer's certification that sealer meets the requirements of this section.

2. Site Quality Control Submittals:

a. Concrete test results.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Reinforcing Bars and Welded Wire Fabric: Deformed steel bars and smooth wire fabric shall comply with Section 03300, Cast-In-Place Concrete.

1. Furnish wire fabric in flat sheets. Do not furnish wire fabricate in rolls.

B. Concrete Materials: Concrete for curbs, gutters, and sidewalks shall be 4,000 psi concrete complying with applicable requirements of Section 03300, Cast-In-Place Concrete, including requirements for formwork, concrete materials, admixtures, bonding materials, curing materials, and others as required.

C. Expansion Joint Material: Preformed bituminous expansion joint filler complying with ASTM D1751.

D. Sealant: Comply with ASTM D6690.

2.2 CONCRETE MIX, DESIGN AND TESTING

A. Comply with applicable requirements of Section 03300, Cast-In-Place Concrete, for concrete mix design, sampling, and testing, and quality control.

B. Design the mix to produce concrete having properties of compressive strength, slump range, and air content as specified in Section 03300, Cast-In-Place Concrete.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine substrate and conditions under which the Work is to be performed and notify Owner's Representative in writing of unsatisfactory conditions. Do not proceed with the Work until unsatisfactory conditions have been corrected.

B. Subgrade:

1. Verify that earthwork is completed to correct line and grade.
2. Verify that subgrade is smooth, properly compacted, and free of frost and excessive moisture in accordance with related Division 2 Sections.

3. Where temporary pavement has been installed, Contractor shall remove the temporary pavement and underlying material and prepare the subgrade to receive new curb, gutter, and sidewalk.
4. The subgrade shall be finished to a width of 6-inches on each side in excess of the width of the curb, gutter, and sidewalk.
5. Do not commence the Work under this section until conditions are satisfactory.

3.2 CONSTRUCTION OF FORMS

A. Set forms to line and grade. Install forms along full length of curb, gutter, and sidewalk.

B. Forms shall be not less than 2 inches thick and depth equal to depth of concrete. Any warped, bent, or otherwise damaged pieces shall be immediately discarded. Comply with Section 03300, Cast-In-Place concrete.

3.3 REINFORCING

A. Locate, place, and support reinforcing as specified in Section 03300, Cast-In-Place Concrete, unless otherwise shown on the Drawings. Size of reinforcing shall be as shown on the Drawings.

3.4 CONCRETE PLACING

A. General:

1. Comply with Section 03300, Cast-In-Place Concrete, and this section relative to mixing and placing concrete.
2. Where new curb and gutter is to tie-in to existing curb and gutter, Contractor shall match existing structure dimensions and elevations for uniform appearance.

B. Placing:

1. Place concrete for curbs and gutters using methods that prevent segregation of the mix. Consolidate concrete along face of forms with an internal vibrator.
2. For sidewalks, place concrete in one-course, monolithic construction, for full width and depth of sidewalk.
3. Machine Formed: At Contractor's option, automatic curb, gutter, and sidewalk machine may be used for forming.

    a. Concrete shall have properties as specified in Section 03300, Cast-In-Place Concrete, except that maximum slump shall be 2.5 inches and air content shall be two percent of design.
    b. Machine forming shall produce curbs, gutters, and sidewalks of required cross-section, lines, grades, finish, and jointing, as specified for conventionally formed concrete.
    c. If results do not conform to the Contract Documents, remove and replace at no additional cost to Owner.

4. The thickness of new sidewalks shall be at least equal to the thickness of existing sidewalks but not less than 4 inches.

3.5 JOINTS

A. General: Provide expansion joints, contraction joints, and construction joints in concrete curbs, gutters, and sidewalks. Provide expansion, contraction, and construction joints perpendicular to formed faces of curb, gutter, or sidewalk. Construct transverse joints at right angles to the Work centerline and as shown.

B. Contraction Joints: Provide joints at ten feet on centers for curbs and gutters, and at five feet on centers for sidewalks.

C. Construction Joints: Place construction joints at locations where concrete placing operations are stopped for more than 30 minutes, except where such ports terminate at expansion joints,

D. Expansion Joints:

1. Expansion joints for curbs shall be one piece shaped to the cross section of the curb, ¾ inch thick, at 50 foot spacing in straight runs or flat curves and recessed ¼ inch below finished surface.
2. Expansion joints for sidewalks shall be one piece shaped to the cross section of the sidewalk, ½ inch thick, at 20 foot spacing and recessed ½ inch below finished surface.
3. Provide expansion joint filler where Work abuts structures. If curb, gutter, or sidewalk is not poured monolithically, provide expansion joints where each abuts the other.

3.6 CONCRETE FINISHING

A. Smooth exposed surface by screeding and floating.

B. Work edges of gutter and sidewalks, back top edge of curb, and transverse joints; and round to ¼ inch radius.

C. Complete surface finishing by drawing a fine hair broom across surface, perpendicular to line of traffic.

3.7 CURING

A. Protect and cure finished concrete curbs, gutters, and sidewalks, complying with applicable requirements of Section 03300, Cast-In-Place Concrete.

3.8 REPAIR AND CLEANING

A. Repair or replace broken or defective curbs, gutters, and sidewalk, unless otherwise directed by Owner’s Representative in writing.

B. Sweep the Work and wash free of stains, discolorations, dirt and other foreign material.

C. Any curb, gutter and sidewalk which is damaged by Contractor outside the limits of Work shall be replaced by Contractor at no additional cost to Owner.

END OF SECTION 02770

SECTION 02920 - SITE RESTORATION

PART 1 - GENERAL

1.1 SCOPE

A. Contractor shall provide all labor, materials, tools, and equipment to restore all lawns, and other exterior surfaces disturbed during performance of the Work to match the appearance and performance of existing corresponding surfaces and to fully restore to pre-construction conditions.

B. Contractor shall provide topsoiling, fertilizing, liming, seeding or sodding, mulching and related work, as required and as directed by the Owner's Representative. Contractor shall prevent nitrogen and phosphate amendments from reaching the receiving waters. Contractor shall water as required until physical completion of the Work.

C. Contractor shall be responsible for the work areas being left clean and in neat condition, temporary items removed, any and all damage repaired, and all refuse removed. All cleaning shall be done in a manner acceptable to the Owner's Representative.

D. Site and access clearing shall be confined to approved construction areas. Contractor shall protect existing vegetation wherever possible. Contractor shall be responsible for damages outside approved construction areas.

1.2 RELATED SECTIONS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Section 02240 – Sediment and Erosion Control Plan

C. Sections 02512 – Asphaltic Concrete Paving.

1.3 DELIVERY, STORAGE AND HANDLING

A. Deliver fertilizer and seed in manufacturer's standard size, unopened bags, cartons or containers, showing weight, analysis, purity, and name of the manufacturer. Store all fertilizer in accordance with the manufacturer's written instructions. Store all seed at the site in a cool dry place in accordance with the manufacturer's written instructions. Replace any seed damaged during storage.

1.4 SUBMITTALS

A. Product Technical Data Including:

1. Acknowledgement that products submitted meet requirements of standards referenced.
2. Signed copies of vendor's statement for seed mixtures required, stating botanical and common name, place of origin, strain, percentage of purity, percentage of germination, and amount of Pure Live Seed (PLS) per bag.

3. Contractor shall submit certificates of material compliance before delivery of material for the following items:

   a. Seed
   b. Sod
   c. Fertilizer (10-6-4)
   d. Limestone
   e. Superphosphate
   f. Mulch
   g. Insecticide

B. None of the above items are to be delivered and used at the Site until approval of the samples by the Owner's Representative but such approval does not constitute final acceptance.

1.5 INSPECTION

A. Source of sod shall be made known to the Owner's Representative at least five (5) days prior to delivery. Sod shall be inspected prior to delivery.

PART 2 - PRODUCTS

2.1 TOPSOIL

A. Provide topsoil from existing stockpiles stripped from the Project site and as approved by the Owner's Representative. When topsoil to be taken from an offsite source has been approved, Contractor shall secure his entire supply from the same source so as to maintain the same quality and grading throughout the Work. Should it become necessary to change the source or characteristics of the material to be used, this shall only be done following review and approval of same by the Owner's Representative.

B. Provide topsoil conforming to the following:

1. Original loam topsoil, well drained homogeneous texture and of uniform grade, without the admixture of subsoil material and entirely free of dense material, hardpan, sod, or any other objectionable foreign material.
2. Containing not less than 4 percent and not more than 20 percent organic matter in that portion of a sample passing a ¼-inch sieve when determined by the wet combustion method on a sample dried at 105 degrees C.
3. Containing a pH value within the range of 5.5 to 7 on that portion of the sample that passes a ¼-inch sieve.
4. Containing the following gradations:

Sieve Designation	Percent Passing
1 inch	100
¼-inch	97 - 100
No. 200	20 - 65 (of the 1/4 inch sieve)

2.2 SEED

A. General

1. Grass seed shall be fresh, recleaned seed of latest crop. Material other than pure live seed shall comprise only non-viable seed, chaff, hulls, harmless inert matter and shall be free from noxious weeds. The mixture shall have less than one-quarter (1/4) of one (1) percent weed content. Seed shall be mixed before delivery and shall consist of the mixture specified and in conformity with the following proportions by weight and meeting with the following standards of seed content. The percentage of purity shown on the label will be acceptable. The percentage of germination shall not be less than the minimum specified.

B. Mixtures

1. Mixture A to be seeded, in general, on areas not regularly mowed.

MIXTURE A	**Mixture Tolerance**		**Germination**	
Tolerance Proportions of Mixture	**Minus**	**Plus**	**Germination**	**Minus**
50% Kentucky 31 Fescue	3%	5%	90%	6%
25% N.K. 100 Perennial Rye Grass	3%	5%	85%	7%
25% Penn Lawn Fescue	3%	5%	90%	6%

2. Mixture B to be seeded, in general, on areas regularly mowed and well-maintained.

MIXTURE B	**Mixture Tolerance**		**Germination**	
Tolerance Proportions of Mixture	**Minus**	**Plus**	**Germination**	**Minus**
50% Merion Blue Grass	**3%**	**5%**	**80%**	**7%**
30% Penn Lawn Fescue	**3%**	**5%**	**90%**	**6%**
20% NK106 Hybrid Rye Grass	**3%**	**5%**	**85%**	**7%**

3. The following brand name mixtures are approved substitutes: Manhattan, Pennfine, N.K. 200 or Norlea in the proper percentages of mixture or any other current approved brand name mixture.

C. Packaging

1. All grass seed shall be delivered in unopened standard size bags of the vendor showing weight, analysis and name of vendor. It shall be stored in such a manner that its effectiveness will not be impaired.

2.3 SOD

A. General

1. Sod shall be a good grade of sod, free from noxious weeds and broadleaf weeds and cut in fifteen (15) inch by forty-eight (48) inch pieces with a depth of one (1) inch minimum root growth. Sod shall be minimum two (2) years old, nursery grown, free of insects, grubs and fungus and with a minimum pH of 6.5. The sod shall be well irrigated and not cut or transported when dry.
2. Sods shall be composed of a vigorous dense growth of green turf and root development shall be capable of supporting the sod during handling, transporting and laying.

B. Analysis

1. The species and varieties from which the sod was grown shall consist of the following permanent grasses unless otherwise approved:

   a. 50% Merion Blue Grass
   b. 25% Penn Lawn Fescue
   c. 25% Fylking Kentucky Blue grass

2.4 COMMERCIAL FERTILIZER

A. Composition

1. Commercial granular fertilizer shall have the following composition by weight: Nitrogen, ten (10) percent; Phosphoric Acid, six (6) percent; Potash, four (4) percent.
2. Nitrogen shall be fifty (50) percent organic (from organic sources, e.g. fish meal, dried blood, dried manure, activated sewage sludge, castor pomace, cottonseed meal, etc.) and fifty (50) percent inorganic. The elements shall be available according to the methods adopted by the Association of Official Agricultural Chemists.

B. Packaging

1. Fertilizers shall be packed in the manufacturer's standard containers weighing not over one-hundred (100) pounds each with the name of the material, net weight of contents and the manufacturer's name and guaranteed analysis appearing on each container.

2.5 STAKING AND GUYING

A. Stakes

1. Bracing stakes shall be of white cedar, chestnut, or other approved wood with bark attached. Underground deadmen shall be at least 4 inches by 4 inches by 4 feet long. All stakes shall be free from insects and fungi.
2. The length shall be as specified; the diameter at the middle shall be not less than 2 inches nor more than 2 ¾ inches; the diameter at the top shall be not less than 1 ¾ inches and the diameter at the butt shall not exceed 3 inches. They shall have a maximum allowable deflection of 10 percent. Stakes shall be pointed.

2.6 GROUND LIMESTONE

A. Composition

1. Ground Limestone (Calcium Carbonate) shall have the following analysis: At least fifty (50) percent shall pass a two-hundred (200) mesh sieve; at least seventy (70) percent shall

pass a one-hundred (100) mesh sieve; and one-hundred (100) percent shall pass a ten (10) mesh sieve. Total carbonates shall not be less than eighty (80) percent or 44.8 percent calcium oxide equivalent; for purposes of calculation, total carbonates shall be considered as Calcium Carbonate.

B. Packaging

1. Ground limestone packed in the manufacturer's standard containers shall weigh not over one-hundred (100) pounds each, with the name of the material, net weight of contents and the manufacturer's name and guaranteed analysis appearing on each container. Bulk shipments shall be accompanied by a certificate covering the names, weight and analysis as specified herewith for packaged material.

2.7 SUPERPHOSPHATE

A. Composition

1. Superphosphate shall be an approximate 0-20-0 formulation with an acceptable minimum of eighteen (18) percent available phosphoric acid.

B. Packaging

1. Superphosphate packed in the manufacturer's standard containers shall weigh not over one-hundred (100) pounds each, with the name of the material, net weight of contents and the manufacturer's name and guaranteed analysis appearing on each container.
2. Bulk shipments shall be accompanied by a certificate covering the names, weight and analysis as specified for packaged material.

2.8 MULCH-WOOD FIBER

A. General

1. Wood fiber suitable for use as a mulch for seeding shall be processed so that the fibers will remain in uniform suspension in water under agitation and will blend with grass seed, fertilizer, ground limestone and other additives to form a homogeneous slurry. It shall have the characteristics which, upon hydraulic application, shall form a blotter-like ground coating with moisture absorption and percolation properties and the ability to cover and hold grass seed in intimate contact with the soil. Wood fiber shall contain no growth or germination inhibiting factors and shall be dyed green. The wood fiber mulch shall be "Superior Fiber" manufactured by Wolbert Master and Assoc. Inc., "Silva Fiber" as manufactured by Weyerhaeuser or equal.

B. Packaging

1. Wood fibers shall be supplied in the manufacturer's unopened standard containers weighing not over one-hundred (100) pounds each, with the name of the material, net weight of contents, the manufacturer's name and the air dry weight of fiber (equivalent to ten (10) percent moisture) appearing on each container.

2.9 EROSION CONTROL FABRICS

A. General

1. Erosion control fabrics for slope protection shall be knitted synthetic netting and/or jute mesh as follows:

   a. The knitted synthetic netting shall consist of a combination of plastic netting interwoven with strips of paper. Paper fill shall be biodegradable of the type recommended by the manufacturer for the application required. Yarn shall be polypropylene. Knitted synthetic netting shall be furnished in firm rolls in widths of five (5) foot or ten (10) foot as required and in lengths of three-hundred-sixty (360) feet and weighing approximately twenty-eight (28) lbs. and fifty-six (56) lbs. respectively in relation to width. Fabric shall be "Hold Gro" as manufactured by the Gulf States Paper Corporation, or equal.

2. Jute mesh shall be of a uniform open plain weave of undyed and unbleached single jute yarn averaging one-hundred-thirty (130) pounds per spindle of 14,400 yds. The yarn shall be of loosely twisted construction having an average twist of not less than 1.6 turns per inch and shall not vary in thickness by more than one-half (1/2) its normal diameter.

   a. Jute mesh shall be woven as follows:

      1) Approximately sixty (60) warp ends per yard of width.
      2) Approximately forty (40) warp ends per linear yards.
      3) Weight of jute mesh shall average 0.9 pounds per square yard ∀ (plus or minus) five (5) percent.
      4) Jute mesh shall be furnished in approximate lengths of seventy-five (75) yards and a width of forty-eight (48) inches ∀ (plus or minus) one (1) inch or as otherwise approved.
      5) Jute mesh shall be "Soil Saver" as manufactured by Ludlow Corporation, or equal.
      6) Shipments of erosion control fabric shall include instructions for installation and staples as required for anchoring fabrics as recommended by the manufacturers.

2.10 SOD STAKES

A. Stakes for pegging sod shall be approximately 1" by 2" and of sufficient length to penetrate the sod, the topsoil and to a minimum depth of two (2) inches of subsoil or shall be of a material and size as approved by the Owner’s Representative.

PART 3 - EXECUTION

3.1 GRADING

A. Rough Grading: Trim and grade lawn areas within the Contract Limits to a level of 4 inches below the finish grades indicated unless otherwise specified herein or where greater depths are indicated. Provide smooth uniform transition to adjacent areas.

B. Finish Grading: Finish surfaces free from irregular surface changes, and as follows:

1. Grassed Areas: Finish areas to receive topsoil to within ½ inch above or below the required subgrade surface elevations.

3.2 SPREADING TOPSOIL

A. Perform topsoil spreading operations only during dry weather.

B. To insure a proper bond with the topsoil, harrow or otherwise loosen the subgrade to a depth of 3 inches before spreading topsoil.

C. Spread topsoil directly upon prepared subgrade to a minimum depth measuring 4 inches after natural settlement in areas to be seeded. Smooth out unsightly variations, bumps, ridges, and depressions that will hold water. Remove stones, litter, or other objectionable material. Finished surfaces shall conform to the contour lines and elevations indicated on the drawings or fixed by the Owner's Representative.

3.3 PREPARATION FOR SEEDING

A. Seed Bed: Scarify soil to a depth of 2 inches in compacted areas. Smooth out unsightly variations, bumps, ridges, and depressions that will hold water. Remove stones, litter, or other objectionable material.

3.4 SEEDING EXECUTION

A. When permitted by the Owner’s Representative, topsoil excavated under other Sections of this Specification shall be reused to provide a six (6) inch layer of topsoil over the top of sewer trenches and other areas required to be seeded and/or sodded. If after backfilling of excavation there are insufficient quantities of top soil conforming to the specified requirements, the Contractor will be required to supply the necessary material to provide a six (6) inch layer of topsoil over the areas to be seeded and/or sodded. Where directed by the Owner’s Representative, the surface of the subsoil shall be scarified or tilled to a minimum depth of two (2) inches before topsoil or soil is placed to permit bonding of the upper soil layer with the subsoil.

B. When delays in seeding and/or sodding operations carry the work beyond the specified seasons or when conditions of high winds, excessive moisture or frost are such that satisfactory results are not likely to be obtained for any stage of the work, the Owner’s Representative will stop the work. The work shall be resumed with the Owner’s Representative's approval when the desired results are likely to be obtained or when approved corrective measures and procedures are adopted.

C. In general, all slopes exceeding a gradient of 1 on 3 shall be sodded. At the option of the Contractor, hydro-seeding with wood fiber mulch and/or seeding with erosion control fabrics may be approved by the Owner’s Representative, in lieu of sodding, for specific slope areas as designated by the Owner’s Representative.

D. At locations where sod must be installed adjacent to areas to be seeded the sodding shall be done before the seed is sown and equipment used during seeding shall cause no damage to the sodded areas.

E. Contractor shall be liable for any damage to property caused by seeding and sodding operations and all areas disturbed shall be restored to their original condition to the satisfaction of the Owner's Representative.

F. One (1) inch of water per week shall be applied on seeded and sodded areas for adequate soil saturation as required by weather conditions and as ordered by the Owner's Representative until final acceptance. Watering shall be continued until final payment. Watering shall be done in a manner which will not cause erosion or other damage to the finished surfaces. Any surfaces which become gullied or otherwise damaged shall be repaired to reestablish the grade and conditions of the soil prior to seeding and/or sodding. After the repairs have been made, the areas shall be reseeded and/or resodded as specified.

3.5 GRASS SEEDING

A. Time of Seeding

1. Seeding shall be performed from March 1st to April 15th and from August 15th to October 15th unless otherwise approved. The Contractor shall notify the Owner's Representative at least forty-eight (48) hours in advance of the time he intends to begin seeding and shall not proceed with such work until permission has been granted.

B. Preparation of Areas

1. The areas to be seeded shall be cultivated and cleaned of all vegetative growth to a depth of six (6) inches except as otherwise directed by the Owner's Representative on designated areas where topsoil has been furnished and placed to a depth of six (6) inches immediately prior to seeding. All weeds, roots, stumps, large stones and debris shall be removed. All washouts or other surface irregularities shall be repaired and additional topsoil shall be placed over the area as required until the entire area to be seeded is covered with a minimum of six (6) inches compacted layer of topsoil. The area to be seeded shall then be rough-graded to conform to the proper elevations as directed by the Owner's Representative.

C. Final Preparations of Seed Bed

1. The areas to be seeded shall be cultivated with a disc, rototiller or scarifier to a depth of four (4) inches. The areas shall be smoothly graded to the proper elevations, free from all unsightly ridges, depressions, or undue irregularities. Areas to be seeded that cannot be cultivated by mechanical means shall be scarified by hand to attain the degree of smoothness and uniformity of adjacent lawn areas. Any soft areas shall be thoroughly compacted with an accepted roller weighing at least two-hundred (200) pounds.

    a. All topsoil not used is to be removed and disposed of at no additional cost to County.
    b. Ground limestone shall be evenly distributed at the rate of two-thousand (2,000) pounds per acre and worked into the top three (3) inches of the soil during the cultivation required for the final preparations of seed bed.

2. Commercial fertilizer (10-6-4) as specified shall be evenly distributed at the rate of fifteen-hundred (1,500) pounds per acre using an approved mechanical spreader and shall be worked into the top one (1) inch of the soil.

3. In the event that it rains between the time the soil on any area is prepared and before it is seeded by any specified method, the soil on all areas to be seeded shall be completely pulverized to a depth of one inch as determined, directed, and approved by the Owner's Representative.

D. Sowing Seed

1. Grass seed shall be sown evenly at the rate of one-hundred-fifty (150) pounds per acre. All seeding is to be done on dry or moderately dry soil and at time when the wind does not exceed a velocity of five (5) miles per hour.
2. A mechanical seeder may be used such as a Brillion seeder or equal to distribute the seed. Rolling will not be necessary.
3. If the grass seed is to be sown by hand, the seed shall be evenly distributed and lightly raked into the top one-quarter (1/4) inch of soil. After seeding and raking, the soil surface is to be rolled with an accepted roller weighing at least two-hundred (200) pounds.

E. Hydro-Seeding

1. All requirements of "Grass Seeding" herein before specified shall apply except as modified herein.
2. Areas to be hydro-seeded shall be scarified sufficiently to break up the surface crust immediately before seeding except where the ground is loose and friable as immediately following grading or as otherwise approved.
3. The hydro-seeder slurry shall be a homogeneous mixture of seed, mulch, limestone and fertilizer which shall remain in suspension in water under agitation. The slurry shall be evenly distributed over the area to be seeded and shall be applied in accordance with the following application rates per acre of surface seeded.

    a. 6,000 gallons of water, 2,000 pounds of wood fiber mulch, 200 pounds of grass seed mixture, 1,200 pounds of ground limestone, 900 pounds of 10-6-4 fertilizer.
    b. The grass seed mixture used for Hydro-Seeding shall conform to Mixture "A" as specified in this Section.

F. Seeding with Erosion Control Fabrics

1. Erosion control fabrics shall be applied in accordance with the manufacturer's instructions.

3.6 SODDING

A. Time of Sodding

1. Sod may be laid at any time between August 15th and April 15th when the ground is not frozen. No sod shall be laid without the approval of the Owner's Representative.

B. Care of Sod

1. Care shall be exercised at all times to retain the soil on the roots of the sod during the process of transplanting. Dumping from vehicles will not be permitted. The sod shall be planted within twenty-four (24) hours from the time it is harvested unless it is tightly rolled or stored roots-to-roots in a satisfactory manner. All sod in stacks shall be kept moist and shall be protected from exposure to the sun and from freezing. No storage longer than two

(2) days will be permitted. Sod which becomes *dried out* or does not meet the Specifications will be *rejected*.

C. Preparation of Area

1. The areas to be sodded shall be cultivated and cleaned of all vegetative growth to a depth of six (6) inches except as otherwise directed by the Owner's Representative or designated areas where topsoil has been furnished and placed to a depth of six (6) inches immediately prior to seeding. All weeds, roots, stumps, large stones and debris shall be removed. All washouts or other surface irregularities shall be repaired and additional topsoil shall be placed over the area as required until the entire area to be sodded is covered with a minimum of six (6) inch compacted layer of topsoil. The areas to be sodded shall then be rough graded to conform to the proper elevations as directed by the Owner's Representative.

D. Final Preparation of Sod Bed

1. The areas to be sodded shall be cultivated with a disc, rototiller or scarifier to a depth of four (4) inches. The area shall be smoothly graded to the proper elevations, free from ridges, depressions or undue irregularities. Areas to be sodded that cannot be cultivated by mechanical means shall be scarified by hand to attain the degree of smoothness and uniformity of adjacent lawn areas. Any soft areas shall be thoroughly compacted with an accepted roller weighing at least two-hundred (200) pounds.
2. The subgrade of topsoil shall be graded so that after the sod is placed, the finished grade shall meet the existing grade or grades as specified by the Owner's Representative.
3. All topsoil not used is to be removed and disposed of properly.
4. Before the sod is placed, an application of superphosphate shall be applied to the subgraded topsoil at the rate of twenty (20) pounds per one-thousand (1,000) square feet and raked into a depth of one (1) inch.
5. Before installation of new sod, the edges of the existing sod shall be cut to form a true straight line so that new sod can be installed properly adjacent to it.

E. Placing Sod

1. In general, sod shall be placed in strips of 15" by 48" with staggered joints and rolled with at least a two-hundred (200) pound roller. No small pieces or strips of sod shall be laid adjacent to edges of sidewalks, curbs and driveways. After rolling, the finished grade shall conform evenly to the grades on the plan or according to grades given by the Owner's Representative. On slop areas, sod shall be thoroughly tamped as approved by the Owner's Representative.
2. If, in the opinion of the Owner's Representative, the sod joints are not closely laid, open and/or loose joints shall be filled with a mixture of grass seed and screened topsoil at the rate of two (2) pounds of seed to one (1) cubic yard of topsoil. Sod shall be thoroughly tamped to a true even surface at the required finished grade and immediately watered.
3. Insecticide for grub proofing sod as approved by the Owner's Representative shall be applied on sodded areas in accordance with the manufacturer's directions.

F. Pegging Sod

1. Sod shall be held in place by sod stakes on all slopes one (1) or two (2) percent or steeper and elsewhere as directed by the Owner's Representative. Pegging shall be done immediately after tamping. At least one (1) stake shall be driven through each sod to be pegged and the stakes shall not be more than two (2) feet apart. Stakes shall have their flat sides against the slope and shall be driven flush.

3.7 ESTABLISHMENT OF SEEDED AND SODDED AREAS

A. Contractor shall maintain, mow and protect the seeded areas until a uniform stand of grass approximately two-and-one-half (2-1/2) inches high has been obtained. Any areas which have been damaged or fail to show a uniform stand of grass shall be scarified, refertilized and reseeded with the original seed mixture until all the designated areas are covered with grass.

B. Contractor shall maintain, mow, water and protect sodded areas until the sod is established. The sod shall be considered satisfactorily established when it is knit into the soil. Should the sod not knit within a two (2) month period during the growing season (spring thaw to winter frost), the Contractor shall remove and then replace the sod in accordance with these Specifications. Sod so removed and replaced shall be established and maintained for a period of two months after the resodding operations have been completed.

END OF SECTION 02920

NO TEXT THIS PAGE

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:

1. Footings.
2. Foundation walls.
3. Slabs-on-grade.
4. Concrete structures.

B. Related Sections:

1. Section 01400, “Quality Control”.
2. Section 02580, “Sanitary Manholes, Frames and Cover”

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.

1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.

E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Owner's Representative.

F. Samples: For waterstops and vapor retarder, if requested by Owner's Representative.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, manufacturer and testing agency.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Waterstops.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Vapor retarders.
11. Semirigid joint filler.
12. Joint-filler strips.
13. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Field quality-control reports.

F. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. 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."

C. Testing Agency Qualifications: Refer to Section 01400, “Quality Control” and Section 01452, “Independent Testing Laboratory Services”.

D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 350-06 “Code Requirements for Environmental Engineering Concrete Structures”
4. ACI 305 “Hot Weather Concreting”
5. ACI 306 “Cold Weather Concreting”

G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

H. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.

1. Build panel approximately 200 sq. ft. (18.6 sq. m) for slab-on-grade and 100 sq. ft. (9.3 sq. m) for formed surface in the location indicated or, if not indicated, as directed by Owner’s Representative.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

I. Preinstallation Conference: Conduct conference at Project site.

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

    a. Contractor's superintendent.
    b. Independent testing agency responsible for concrete design mixtures.
    c. Ready-mix concrete manufacturer.
    d. Concrete subcontractor.
    e. Special concrete finish subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semirigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.

E. Chamfer Strips: Wood, metal, PVC, or rubber strips, ¾" by ¾" (19 by 19 mm), minimum.

F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

G. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

H. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.

3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing or wet well/channels or any wastewater holding or conveying structure.

2.2 STEEL REINFORCEMENT

A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.

C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.4 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type II, Type I/II, gray. Supplement with the following:

a. Fly Ash: ASTM C 618, Class F.
b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.

2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag, Type IP, portland-pozzolan cement.

B. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.

1. Maximum Coarse-Aggregate Size: 3/4 inch (19 mm) nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Water: ASTM C 94/C 94M and potable.

2.5 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Axim Italcementi Group, Inc.; CATEXOL CN-CI.
b. BASF Construction Chemicals - Building Systems; Rheocrete CNI.
c. Euclid Chemical Company (The), an RPM company; ARRMATECT EUCON BCN EUCON CIA.
d. Grace Construction Products, W. R. Grace & Co.; DCI.
e. Sika Corporation; Sika CNI.

D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Rheocrete 222+.
b. Cortec Corporation; MCI- 2000 2005NS.
c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
d. Sika Corporation; FerroGard 901.

2.6 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes. Field fabricated or bent waterstops will not be permitted.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

    a. BoMetals, Inc.
    b. Greenstreak.
    c. Paul Murphy Plastics Company.
    d. Vinylex Corp.

2. Profile: Flat, dumbell with center bulb, flat, dumbbell without center bulb, ribbed with center bulb, or ribbed without center bulb.
3. Dimensions: 6 inches by 3/8 inch thick (150 mm by 10 mm thick); nontapered.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
    b. Fortifiber Building Systems Group; Moistop Ultra 10.
    c. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
    d. Insulation Solutions, Inc.; Viper VaporCheck 10.
    e. Meadows, W. R., Inc.; Perminator 10 mil.
    f. Raven Industries Inc.; Vapor Block 10.
    g. Reef Industries, Inc.; Griffolyn 10 mil Green.
    h. Stego Industries, LLC; Stego Wrap 10 mil Class A.

B. Sheet Vapor Retarder: Polyethylene sheet, ASTM D 4397, not less than 10 mils (0.25 mm) thick.

C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

D. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Axim Italcementi Group, Inc.; CATEXOL CimFilm.

b. BASF Construction Chemicals - Building Systems; Confilm.
c. ChemMasters; SprayFilm.
d. Conspec by Dayton Superior; Aquafilm.
e. Dayton Superior Corporation; Sure Film (J-74).
f. Edoco by Dayton Superior; BurkeFilm.
g. Euclid Chemical Company (The), an RPM company; Eucobar.
h. Kaufman Products, Inc.; Vapor-Aid.
i. Lambert Corporation; LAMBCO Skin.
j. L&M Construction Chemicals, Inc.; E-CON.
k. Meadows, W. R., Inc.; EVAPRE.
l. Metalcrete Industries; Waterhold.
m. Nox-Crete Products Group; MONOFILM.
n. Sika Corporation; SikaFilm.
o. SpecChem, LLC; Spec Film.
p. Symons by Dayton Superior; Finishing Aid.
q. TK Products, Division of Sierra Corporation; TK-2120 TRI-FILM.
r. Unitex; PRO-FILM.
s. Vexcon Chemicals, Inc.; Certi-Vex Envio Set.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Anti-Hydro International, Inc.; AH Curing Compound #2 DR WB.
b. BASF Construction Chemicals - Building Systems; Kure 200.
c. ChemMasters; Safe-Cure Clear.
d. Conspec by Dayton Superior; W.B. Resin Cure.
e. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
f. Edoco by Dayton Superior; Res X Cure WB.
g. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
h. Kaufman Products, Inc.; Thinfilm 420.
i. Lambert Corporation; AQUA KURE - CLEAR.
j. L&M Construction Chemicals, Inc.; L&M Cure R.
k. Meadows, W. R., Inc.; 1100-CLEAR.
l. Nox-Crete Products Group; Resin Cure E.
m. Right Pointe; Clear Water Resin.
n. SpecChem, LLC; Spec Rez Clear.
o. Symons by Dayton Superior; Resi-Chem Clear.
p. TK Products, Division of Sierra Corporation; TK-2519 DC WB.
q. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Anti-Hydro International, Inc.; AH Clear Cure WB.
b. BASF Construction Chemicals - Building Systems; Kure-N-Seal WB.
c. ChemMasters; Safe-Cure & Seal 20.
d. Conspec by Dayton Superior; Cure and Seal WB.
e. Cresset Chemical Company; Crete-Trete 309-VOC Cure & Seal.
f. Dayton Superior Corporation; Safe Cure and Seal (J-18).
g. Edoco by Dayton Superior; Spartan Cote WB II.
h. Euclid Chemical Company (The), an RPM company; Aqua Cure VOX; Clearseal WB 150.
i. Kaufman Products, Inc.; Cure & Seal 309 Emulsion.
j. Lambert Corporation; Glazecote Sealer-20.
k. L&M Construction Chemicals, Inc.; Dress & Seal WB.
l. Meadows, W. R., Inc.; Vocomp-20.
m. Metalcrete Industries; Metcure.
n. Nox-Crete Products Group; Cure & Seal 150E.
o. Symons by Dayton Superior; Cure & Seal 18 Percent E.
p. TK Products, Division of Sierra Corporation; TK-2519 WB.
q. Vexcon Chemicals, Inc.; Starseal 309.

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Kure-N-Seal W.
b. ChemMasters; Safe-Cure Clear.
c. Conspec by Dayton Superior; High Seal.
d. Dayton Superior Corporation; Safe Cure and Seal (J-19).
e. Edoco by Dayton Superior; Spartan Cote WB II 20 Percent.
f. Euclid Chemical Company (The), an RPM company; Diamond Clear VOX; Clearseal WB STD.
g. Kaufman Products, Inc.; SureCure Emulsion.
h. Lambert Corporation; Glazecote Sealer-20.
i. L&M Construction Chemicals, Inc.; Dress & Seal WB.
j. Meadows, W. R., Inc.; Vocomp-20.
k. Metalcrete Industries; Metcure 0800.
l. Nox-Crete Products Group; Cure & Seal 200E.
m. Symons by Dayton Superior; Cure & Seal 18 Percent E.
n. Vexcon Chemicals, Inc.; Starseal 0800.

H. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. BASF Construction Chemicals - Building Systems; Kure 1315.
b. ChemMasters; Polyseal WB.
c. Conspec by Dayton Superior; Sealcure 1315 WB.
d. Edoco by Dayton Superior; Cureseal 1315 WB.
e. Euclid Chemical Company (The), an RPM company; Super Diamond Clear VOX; LusterSeal WB 300.
f. Kaufman Products, Inc.; Sure Cure 25 Emulsion.
g. Lambert Corporation; UV Safe Seal.
h. L&M Construction Chemicals, Inc.; Lumiseal WB Plus.
i. Meadows, W. R., Inc.; Vocomp-30.
j. Metalcrete Industries; Metcure 30.
k. Right Pointe; Right Sheen WB30.
l. Symons by Dayton Superior; Cure & Seal 31 Percent E.
m. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

2. VOC Content: Curing and sealing compounds shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

B. Semi-rigid Joint Filler: Two-component, semi-rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- (0.55-mm-) thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.

2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4100 psi (29 MPa) at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch (6.4 mm) and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Ground Granulated Blast-Furnace Slag: 50 percent.
4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Ground Granulated Blast-Furnace Slag, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to .10 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days.
2. Maximum Water-Cementitious Materials Ratio: 0.45.
3. Slump Limit: 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).
4. Air Content: 6 Percent, plus or minus 1.5 percent at point of delivery for ¾-inch (19 mm) nominal maximum aggregate size.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. (0.76 cu. m) or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd. (0.76 cu. m), increase mixing time by 15 seconds for each additional 1 cu. yd. (0.76 cu. m).
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch (3.2 mm) for smooth-formed finished surfaces.
2. Class C, 1/2 inch (13 mm) for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 48 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Owner’s Representative.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.

C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 VAPOR RETARDERS

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.6 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.7 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Owner's Representative.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch (3.2 mm) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as, foundation walls, and other locations, as indicated.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants are indicated.
3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.8 WATERSTOPS

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

3.9 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Owner’s Representative.

C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

G. Hot-Weather Placement: Comply with ACI 305 and as follows:

1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in one direction.

1. Apply scratch finish to surfaces indicated.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces exposed to view.
2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

    a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
    b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
    c. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
    d. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.

3. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-ft.- (3.05-m-) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 3/16 inch (4.8 mm).

E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Owner's Representative before application.

3.12 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

3.13 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

    a. Water.
    b. Continuous water-fog spray.
    c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12 inch (300 mm) lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

    a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound will not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semi-rigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Owner’s Representative. Remove and replace concrete that cannot be repaired and patched to Owner’s Representatives approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 (1.18 mm) sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension to solid concrete. Limit cut depth to 3/4 inch (19 mm). Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.

2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Owner's Representative.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Owner's Representatives approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Owner's Representatives approval.

3.16 FIELD QUALITY CONTROL

A. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.
6. Curing procedures and maintenance of curing temperature.
7. Verification of concrete strength before removal of shores and forms from beams and slabs.

C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:

1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture, plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
4. Concrete Temperature: ASTM C 1064/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.
5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
6. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and field cure one set of five (5) standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M.

    a. Test one specimen at 7 days and three specimens at 28 days. Test one specimen at 56 days should the 28 day breaks not meet the specified strength.
    b. A compressive-strength test shall be the average compressive strength from a set of three specimens obtained from same composite sample and tested at age indicated.

8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
9. Test results shall be reported in writing to Owner’s Representative, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Owner's Representative but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Owner's Representative. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Owner's Representative.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

D. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 24 hours of finishing.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03300

SECTION 07160 – BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, tools, equipment and incidentals as shown, specified and required to furnish and install bituminous dampproofing on concrete and masonary surfaces.
2. Dampproofing shall apply to all concrete surfaces exposed to earth. Top elevation of dampproofing shall be final grade less 0.5'.
3. Dampproofing shall apply to cavity wall of interior wythe of masonry cavity walls (i.e., dampproofing of exterior face of CMU behind brick face).
4. Types of products required include the following:

    a. Cold-applied asphalt (heavy fibrated, semi-fibrated, non-fibrated) solvent based, asbestos-free dampproofing, for exterior structure and wall surfaces above and below grade.
    b. Cold-applied asphalt (heavy fibrated, semi-fibrated, non-fibrated) water emulsion, asbestos-free dampproofing, for exterior structure and wall surfaces above and below grade.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with the bituminous dampproofing.
2. Notify other contractors in advance of the installation of the bituminous dampproofing to provide the other contractors with sufficient time for the installation of items included in their contracts that must be installed before the bituminous dampproofing.

C. Related Sections:

1. Section 02580, Sanitary Manholes, Frames and Covers

1.2 REFERENCES

A. Standards referenced in this Section are listed below:

1. American Society for Testing and Materials, (ASTM).

    a. ASTM D 1187, Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal.
    b. ASTM D 1227, Specification for Emulsified Asphalt Used as Protective Coating for Roofing.
    c. ASTM D 4479, Specification for Asphalt Roof Coatings - Asbestos-Free.
    d. ASTM D 4586, Specification for Asphalt Roof Cement, Asbestos-Free.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage a single installer with successful experience in the installation of bituminous dampproofing, and who will submit evidence, in writing, of being acceptable to the manufacturer of the bituminous dampproofing materials and who agrees to employ only tradesmen with specific skill and successful experience in this type of Work.

B. Quality Source Control: Obtain primary dampproofing materials from only one manufacturer.

1.4 SUBMITTALS

A. Shop Drawings: Submit the following:

1. Manufacturer's specifications, installation instructions and general recommend-dations for each required dampproofing material.
2. Include manufacturer's certification or other data substantiating that the materials comply with the requirements and are recommended by the manufacturer for the application shown or specified.

B. Certificates: Submit the following:

1. Certification indicating that bulk bituminous materials, if any, delivered to the Site comply with the requirements. Include statistical and descriptive data for each product. Submit certificate with each load before it is used.
2. Certification indicating compliance with governing regulations for air quality regarding maximum VOC content for bituminous dampproofing materials.
3. Certification that materials supplied is asbestos-free as required by specified ASTM designations.

1.5 DELIVERY, STORAGE AND HANDLING

A. Delivery of Materials:

1. Deliver bituminous dampproofing in original, unopened and undamaged containers with manufacturer’s information indicating compliance with this Section and as approved on Shop Drawings.
2. Do not store damaged or opened containers on Site. Remove from Site and do not offer such damaged material again for approval.
3. Present certificates with each load, before it is used, listing the shelf life, date, amount and other data as may be required to establish acceptability of the materials delivered to the Site.
4. Protect material from deterioration during delivery.

B. Storage of Materials:

1. Store material in a manner recommended by the dampproofing manufacturer.
2. Store emulsions at temperatures above 40°F.

C. Handling of Materials:

1. Do not open containers or mix components until necessary preparatory Work has been completed.
2. Do not use solvent based dampproofing without adequate ventilation to prevent the build-up of

explosive fumes.

1.6 JOB CONDITIONS

A. Preparation: Do not proceed with bituminous dampproofing Work until blocking, nailers, piping, conduit and other projections through the substrate have been installed, with substrate properly patched and sealed or flashed to receive the bituminous dampproofing.

B. Environmental Conditions: When ambient temperature is 40°F or less, do not proceed with bituminous dampproofing. Do not apply bituminous dampproofing materials to frozen substrates or to any substrate in a condition not complying with manufacturer's recommendations.

1.7 GUARANTEE

A. For interior and concealed-in-wall uses, provide only a type of bituminous bituminous dampproofing material which is guaranteed by the manufacturer to be odor-free after drying for 24 hours.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Applied, Cut-Back Asphalt Dampproofing:

1. Asphalt Compound: Manufacturer's standard asphalt and cut-back solvent-based compound with mineral stabilizers, recommended for below-grade exterior and for above-grade interior applications, compounded to penetrate the substrate and build to a moisture-resistant, firm, elastic coating.
2. Provide heavy-fibrated, long fibered type, trowel-applied mastic compound, complying with ASTM D 4586, Type I.
3. Products and Manufacturers: Provide one of the following:

    a. Hydrocide Mastic by ChemRex, Incorporated, Sonneborn Building Products Division.
    b. 86 AF Fibrater Trowel Mastic by Karnak Chemical Corporation.
    c. Or equal.

4. Provide heavy-fibrated, short fibered type, spray or brush-applied mastic compound, complying with ASTM D 4479, Type I.

    a. Products and Manufacturers: Provide one of the following:

        1) Hydrocide Semimastic by ChemRex, Incorporated, Sonneborn Building Products Division.
        2) Karnak 83 AF Fibrater Dampproofing by Karnak Chemical Corporation.
        3) Or equal.

5. Provide non-fibrated type, spray-applied liquid compound, complying with ASTM D 4479, Type I.
6. Products and Manufacturers: Provide one of the following:

    a. Spray-Mastic by W.R. Meadows, Incorporated.
    b. Or equal.

B. Cold-Applied Asphalt Emulsion Dampproofing:

1. Asphalt Emulsion: Manufacturer's standard asphalt and water emulsion, recommended for below-grade exterior and for above-grade interior applications to either damp (green) or dry substrates, compounded to penetrate the substrate and build to a moisture-resistant but breathing type of elastic coating.
2. Provide heavy-fibrated type, trowel-applied mastic compound, complying with ASTM D 1187, Type II or ASTM D 1227, Type IV.
3. Products and Manufacturers: Provide one of the following:

    a. Hydrocide 700 Mastic by ChemRex, Incorporated, Sonneborn Building Products Division.
    b. 920 Fibrater (Trowel Grade) Dampproofing by Karnak Chemical Corporation.
    c. Or equal.

4. Provide semi-fibrated, semimastic emulsion type, brush-applied mastic compound, conforming to ASTM D 1227, Type IV.
5. Products and Manufacturers: Provide one of the following:

    a. Hydrocide 700B Semimastic by ChemRex, Incorporated, Sonneborn Building Products Division.
    b. 220 AF Fibrater Dampproofing by Karnak Chemical Corporation.
    c. Or equal.

6. Provide non-fibrated, liquid emulsion type, spray or brush-applied mastic compound, complying with ASTM D 1187, Type I or Type II and ASTM D 1227, Type III.
7. Products and Manufacturers: Provide one of the following:

    a. Hydrocide 600 by ChemRex, Incorporated, Sonneborn Building Products Division.
    b. 100 Nonfibrater Emulsion Coating by Karnak Chemical Corporation.
    c. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. Contractor and his installer shall examine the substrates and the conditions under which the bituminous dampproofing is to be applied, and advise Owner’s Representative, in writing, of unsatisfactory conditions. Do not proceed with the bituminous dampproofing Work until unsatisfactory conditions have been corrected in a manner acceptable to Owner’s Representative.

3.2 PREPARATION

A. Surfaces to receive dampproofing shall be clean and smooth.

B. Clean the substrate of foreign matter, dirt, oil, loose materials and other substances which interfere with penetration, bond or performance of bituminous dampproofing materials.

C. Dampen all dry surfaces with water and keep surfaces damp ahead of application.

3.3 INSTALLATION

A. Cold-Applied Cut-Back Bituminous Dampproofing on Exterior and Interior Surfaces:

1. Prime substrate if recommended by manufacturer's instructions, using type and quantity of primer recommended by manufacturer.
2. Apply coat of cold-applied, non-fibrated liquid bituminous dampproofing material, by brushing or spraying at the rate of 1.0 gallon per 80 square feet, to produce a uniform dry film thickness of not less than 12-mils.

    a. Repeat the application, after allowing 24 hours for drying of first coat. Apply second coat at the rate of 1.0 gallon per 120 square feet. Apply second coat at right angles to first coat.

3. Cant Strips, Fillers and Extension of Coatings: On exterior surfaces, where lower edge of dampproofing terminates at a horizontal projection (including footings under walls), provide a 2-inch by 2-inch bituminous grout cant strip. Mix sand with the specified bituminous material to form a plastic grout; form and compact in place. Provide bituminous grout fillers where shown and wherever required to close openings in the substrate. Extend coatings a distance of 12-inches onto adjoining walls, but do not extend onto surfaces to remain exposed-to-view.
4. Fill all cracks, crevices and grooves. Make sure coating is continuous and free from breaks and pinholes. Spread around all joints, grooves, and slots and into all chases, corners, reveals and soffits.

B. Cold-Applied Bituminous Dampproofing Emulsions on Exterior and Interior Surfaces:

1. Apply coat of fibrated mastic, asphalt emulsion bituminous dampproofing material, by trowelling onto the substrate at a uniform rate of 1.0 gallon per 15 square feet, to produce a uniform dry film not less than 1/16-inch thick.
2. Apply coat of semi-fibrated, semi-mastic, bituminous emulsion dampproofing materials, by brushing or spraying at the rate of 1.0 gallon per 20 square feet, to produce a uniform dry film not less than 1/16-inch thick.
3. Apply coat of liquid emulsion bituminous dampproofing material by spraying at the rate of 1.0 gallon per 20 square feet, to produce a uniform dry film not less than 1/16-inch thick. Apply in two coats if necessary to obtain required thickness, allowing time for complete drying between coats.
4. Cant Strips, Fillers and Extension of Coatings: On exterior surfaces, where lower edge of dampproofing terminates at a horizontal projection (including footings under walls), provide a 2-inch by 2-inch bituminous grout cant strip. Mix sand with the specified bituminous material to form a plastic grout; form and compact in place. Provide bituminous grout fillers where shown and wherever required to close openings in the substrate. Extend coatings a distance of 12-inches onto adjoining walls, but do not extend onto surfaces to remain exposed-to-view.

3.4 ADJUSTMENT AND CLEANING

A. Protect other work from spillage of bituminous dampproofing materials, and prevent materials from penetrating and clogging drains and conductors.

B. Replace or restore other work which is soiled or otherwise damaged by the installation of the bituminous dampproofing.

END OF SECTION 07160

NO TEXT THIS PAGE

SECTION 11300 – GRINDER PUMP STATIONS (EOne)

PART 1 - GENERAL

1.1 GENERAL DESCRIPTION:

A. Contractor shall furnish complete factory-built and tested Grinder Pump Stations, each consisting of either one (1) or two (2) grinder pumps suitably mounted in a basin constructed of high density polyethylene (HDPE) with dimensions and capacities as shown on the Contract Drawings, NEMA 6P electrical quick disconnect (EQD), pump removal system, stainless steel discharge assembly/shut-off valve, anti-siphon valve/check valve, each assembled in the basin, electrical alarm panel and all necessary internal wiring and controls. All components and materials shall be as specified herein. For ease of serviceability, all pump, motor/grinder units shall be of like type and horsepower throughout the system.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 02250 - Excavation Support and Protection

B. Section 02315 - Excavation and Backfill

C. Section 02320 – Dewatering

D. Section 02920 - Site Restoration

E. Section 03300 - Cast in Place Concrete

F. Division 16 – Electrical

1.3 SUBMITTALS

A. Contractor shall furnish shop drawings detailing the equipment to be furnished including dimensional data and materials of construction.

1.4 MANUFACTURER

A. Grinder pump stations, complete with all appurtenances, form an integral system, and as such, shall be supplied by one grinder pump station manufacturer. Contractor shall be responsible for the satisfactory operation of the entire system. Equipment specified shall be a product of a manufacturer experienced in the design and manufacture of grinder pumps for specific use in low pressure sewage systems. Contractor shall submit detailed installation and user instructions for the specified product, submit evidence of an established service program/company including complete parts and service manuals, and be responsible for maintaining a continuing inventory of grinder pump replacement parts.

B. Grinder pump stations shall be Model DH071-93 and Model DH152-93, as manufactured by Environment One Corporation, or approved equal.

1.5 OPERATING CONDITIONS

A. Pumps shall be capable of delivering 15 GPM against a rated total dynamic head of 0 feet (0 PSIG), 11 GPM against a rated total dynamic head of 92 feet (40 PSIG), and 7.8 GPM against a rated total dynamic head of 185 feet (80 PSIG). Pumps must also be capable of operating at negative total dynamic head without overloading the motors. Under no conditions shall in-line piping or valving be allowed to create a false apparent head.

1.6 WARRANTY

A. Grinder pump manufacturer shall provide a part(s) and labor warranty on the complete station and accessories, including, but not limited to, panel and redundant check valve, for a period of twenty-four (24) months after notice of Owner's acceptance, but no greater than twenty-seven (27) months after receipt of shipment. Any manufacturing defects found during the warranty period will be reported to the Contractor by the Owner and will be corrected by the Contractor at no cost to the Owner.

PART 2 - PRODUCT

2.1 PUMP

A. Pump shall be a custom designed, integral, vertical rotor, motor driven, solids handling pump of the progressing cavity type with a single mechanical seal. Double radial O-ring seals are required at all casting joints to minimize corrosion and create a protective barrier. All pump castings shall be cast iron, fully epoxy coated to 8-10 mil Nominal dry thickness, wet applied. Rotor shall be through-hardened, highly polished, precipitation hardened stainless steel. Stator shall be of a specifically compounded ethylene propylene synthetic elastomer. This material shall be suitable for domestic wastewater service. Its physical properties shall include high tear and abrasion resistance, grease resistance, water and detergent resistance, temperature stability, excellent aging properties, and outstanding wear resistance. Buna-N is not acceptable as a stator material because it does not exhibit the properties as outlined above and required for wastewater service.

2.2 GRINDER

A. Grinder shall be placed immediately below the pumping elements and shall be direct-driven by a single, one-piece motor shaft. The grinder impeller (cutter wheel) assembly shall be securely fastened to the pump motor shaft by means of a threaded connection attaching the grinder impeller to the motor shaft. Attachment by means of pins or keys will not be acceptable. The grinder impeller shall be a one-piece, 4140 cutter wheel of the rotating type with inductively hardened cutter teeth. The cutter teeth shall be inductively hardened to Rockwell 50 – 60c for abrasion resistance. The shredder ring shall be of the stationary type and the material shall be white cast iron. The teeth shall be ground into the material to achieve effective grinding. The shredder ring shall have a staggered tooth pattern with only one edge engaged at a time, maximizing the cutting torque.

B. The assembly shall be dynamically balanced and operate without objectionable noise or vibration over the entire range of recommended operating pressures. The grinder shall be constructed so as to minimize clogging and jamming under all normal operating conditions including starting. Sufficient vortex action shall be created to scour the tank free of deposits or sludge banks which would impair the operation of the pump. These requirements shall be accomplished by the following, in conjunction with the pump:

1. Grinder shall be positioned in such a way that solids are fed in an upward flow direction.
2. Maximum flow rate through the cutting mechanism must not exceed 4 feet per second. This is a critical design element to minimize jamming and as such must be adhered to.
3. Inlet shroud shall have a diameter of no less than 5 inches. Inlet shrouds that are less than 5 inches in diameter will not be accepted due to their inability to maintain the specified 4 feet per second maximum inlet velocity which by design prevents unnecessary jamming of the cutter mechanism and minimizes blinding of the pump by large objects that block the inlet shroud.
4. Impeller mechanism must rotate at a nominal speed of no greater than 1800 rpm.

C. Grinder shall be capable of reducing all components in normal domestic sewage, including a reasonable amount of "foreign objects," such as paper, wood, plastic, glass, wipes, rubber and the like, to finely-divided particles which will pass freely through the passages of the pump and the 1-1/4" diameter stainless steel discharge piping.

2.3 ELECTRIC MOTOR

A. As a maximum, the motor shall be a 1 HP, 1725 RPM, 240 Volt 60 Hertz, 1 Phase, capacitor start, ball bearing, air-cooled induction type with Class F installation, low starting current not to exceed 30 amperes and high starting torque of 8.4 foot pounds. Motor shall be press-fit into the casting for better heat transfer and longer winding life. Inherent protection against running overloads or locked rotor conditions for the pump motor shall be provided by the use of an automatic-reset, integral thermal overload protector incorporated into the motor. Motor protector combination shall have been specifically investigated and listed by Underwriters Laboratories, Inc., for the application. Non-capacitor start motors or permanent split capacitor motors will not be accepted because of their reduced starting torque and consequent diminished grinding capability. The wet portion of the motor armature must be 300 Series stainless. To reduce the potential of environmental concerns, the expense of handling and disposing of oil, and the associated maintenance costs, oil-filled motors will not be accepted.

B. Contractor shall supply a buck boost transformer to increase the voltage to the motor from the Facility supplied 208 Volt to the 240 Volt required by the electric motor.

2.4 MECHANICAL SEAL

A. The pump/core shall be provided with a mechanical shaft seal to prevent leakage between the motor and pump. The seal shall have a stationary ceramic seat and carbon rotating surface with faces precision lapped and held in position by a stainless steel spring.

2.5 TANK & INTEGRAL ACCESSWAY

A. Tanks and integral accessway shall be Model DH152, 150 Gallon, Duplex Unit constructed of High Density Polyethylene (HDPE) or Model DH071, 70 Gallon, Simplex Unit constructed of High Density Polyethylene (HDPE).

B. Tanks shall be a Wetwell/Drywell design made of high density polyethylene, with a grade selected to provide the necessary environmental stress cracking resistance. Corrugated sections are to be made of a double wall construction with the internal wall being generally smooth to promote scouring. The corrugations of the outside wall are to be a minimum amplitude of 1-1/2" to provide necessary transverse stiffness. Any incidental sections of a single wall

construction are to be 0.250” thick (minimum). All seams created during tank construction are to be thermally welded and factory tested for leak tightness. The tank wall and bottom must withstand the pressure exerted by saturated soil loading at maximum burial depth. All station components must function normally when exposed to 150 percent of the maximum external soil and hydrostatic pressure.

C. Tanks shall be furnished with one EPDM grommet fitting to accept a 6" SDR-35 pipe.

D. Tank accessway shall be an integral extension of the Wetwell assembly and shall include a lockable cover assembly providing low profile mounting and watertight capability. The cover shall be high density polyethylene, green in color, with a load rating of 150 lbs per square foot. The accessway design and construction shall enable field adjustment of the station height in increments of 3" or less without the use of any adhesives or sealants requiring cure time before installation can be completed.

E. Pump station shall have all necessary penetrations molded in and factory sealed. To ensure a leak free installation no field penetrations will be acceptable.

F. All discharge piping shall be constructed of 304 stainless steel. The discharge shall terminate outside the accessway bulkhead with a stainless steel, 1-1/4” Female NPT fitting. The discharge piping shall include a stainless steel ball valve rated for 235 psi WOG; PVC ball valves or brass ball/gate will not be accepted. The bulkhead penetration shall be factory installed and warranted by the manufacturer to be watertight.

G. Accessway shall include a single NEMA 6P Electrical Quick Disconnect (EQD) for all power and control functions, factory installed with accessway penetrations warranted by the manufacturer to be watertight. The EQD will be supplied with 50’ (min.) of useable Electrical Supply Cable (ESC) outside the station, to connect to the alarm panel. The ESC shall be installed in the basin by the manufacturer. Field assembly of the ESC into the basin is not acceptable. The EQD shall require no tools for connecting, seal against water before the electrical connection is made, and include radial seals to assure a watertight seal regardless of tightening torque. Plug-type connections of the power cable onto the pump housing will not be acceptable. A junction box shall not be permitted in the accessway. The EQD shall be so designed to be conducive to field wiring as required. The accessway shall also include an integral 2-inch vent to prevent sewage gases from accumulating in the tank.

2.6 CHECK VALVE

A. The pump discharge shall be equipped with a factory installed, gravity operated, flapper-type integral check valve built into the stainless steel discharge piping. The check valve will provide a full-ported passageway when open, and shall introduce a friction loss of less than 6 inches of water at maximum rated flow. Moving parts will be made of a 300 Series stainless steel and fabric reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly providing a maximum degree of freedom to assure seating even at a very low back-pressure. The valve body shall be an injection molded part made of an engineered thermoplastic resin. The valve shall be rated for continuous operating pressure of 235 psi. Ball-type check valves are unacceptable.

B. Each grinder pump installation shall also include one separate check valve of the type specified

herein for installation in the 1-½" service lateral between the grinder pump station and the new sewer main, preferably next to the curb stop.

2.7 ANTI-SIPHON VALVE

A. The pump discharge shall be equipped with a factory-installed, gravity-operated, flapper-type integral anti-siphon valve built into the stainless steel discharge piping. Moving parts will be made of 300 Series stainless steel and fabric-reinforced synthetic elastomer to ensure corrosion resistance, dimensional stability, and fatigue strength. A nonmetallic hinge shall be an integral part of the flapper assembly, providing a maximum degree of freedom to ensure proper operation even at a very low pressure. The valve body shall be injection-molded from an engineered thermoplastic resin. Holes or ports in the discharge piping are not acceptable. The anti-siphon port diameter shall be no less than 60% of the inside diameter of the pump discharge piping.

2.8 CORE UNIT

A. The grinder pump station shall have a cartridge type, easily removable core assembly consisting of pump, motor, grinder, all motor controls, check valve, anti-siphon valve, level controls, electrical quick disconnect and wiring. The core unit shall be installed in the basin by the manufacturer. Field assembly of the pump and controls into the basin is not acceptable. The core unit shall seal to the tank deck with a stainless-steel latch assembly. The latch assembly must be actuated utilizing a single quick release mechanism requiring no more than a half turn of a wrench. The watertight integrity of each core unit shall be established by a 100 percent factory test at a minimum of 5 PSIG.

2.9 CONTROLS

A. All necessary motor starting controls shall be located in the cast iron enclosure of the core unit secured by stainless steel fasteners. Locating the motor starting controls in a plastic enclosure is not acceptable. The wastewater level sensing controls shall be housed in a separate enclosure from motor starting controls. The level sensor housing must be sealed via a radial type seal; solvents or glues are not acceptable. The level sensing control housing must be integrally attached to pump assembly so that it may be removed from the station with the pump and in such a way as to minimize the potential for the accumulation of grease and debris accumulation, etc. The level sensing housing must be a high-impact thermoplastic copolymer over-molded with a thermo plastic elastomer. The use of PVC for the level sensing housing is not acceptable.

B. Non-fouling wastewater level controls for controlling pump operation shall be accomplished by monitoring the pressure changes in an integral air column connected to a pressure switch. The air column shall be integrally molded from a thermoplastic elastomer suitable for use in wastewater and with excellent impact resistance. The air column shall have only a single connection between the water level being monitored and the pressure switch. Any connections are to be sealed radially with redundant O-rings. The level detection device shall have no moving parts in direct contact with the wastewater and shall be integral to the pump core assembly in a single, readily-exchanged unit. Depressing the push to run button must operate the pump even with the level sensor housing removed from the pump.

C. All fasteners throughout the assembly shall be 300 Series stainless steel. High-level sensing will be accomplished in the manner detailed above by a separate air column sensor and pressure

switch of the same type. Closure of the high-level sensing device will energize an alarm circuit as well as a redundant pump-on circuit. For increased reliability, pump ON/OFF and high-level alarm functions shall not be controlled by the same switch. Float switches of any kind, including float trees, will not be accepted. To assure reliable operation of the pressure switches, each core shall be equipped with a factory installed equalizer diaphragm that compensates for any atmospheric pressure or temperature changes. Tube or piping runs outside of the station tank or into tank-mounted junction boxes providing pressure switch equalization will not be permitted. The grinder pump will be furnished with a 6 conductor 14 gauge, type SJOW cable, pre-wired and watertight to meet UL requirements with a FACTORY INSTALLED NEMA 6P EQD half attached to it.

2.10 PROTECT PLUS ALARM PANEL

A. Each grinder pump station shall include a NEMA 4X, UL-listed alarm panel suitable for wall or pole mounting. The NEMA 4X enclosure shall be manufactured of thermoplastic to ensure corrosion resistance. The enclosure shall include a hinged, lockable cover with padlock, preventing access to electrical components, and creating a secured safety front to allow access only to authorized personnel. The standard enclosure shall not exceed 12.5" W x 16" H x 7.5" D.

B. The panel shall contain one 15-amp single pole circuit breaker for the alarm circuit and one 15-amp double pole circuit breaker per core for the power circuit. The panel shall contain a push-to-run feature, an internal run indicator, and a complete alarm circuit. All circuit boards in the alarm panel are to be protected with a conformal coating on both sides and the AC power circuit shall include an auto resetting fuse.

C. The alarm panel shall include the following features: external audible and visual alarm; push-to-run switch; push-to-silence switch; redundant pump start; and high level alarm capability. The alarm sequence is to be as follows when the pump and alarm breakers are on:

1. When liquid level in the sewage wet-well rises above the alarm level, the contacts on the alarm pressure switch activate, audible and visual alarms are activated, and the redundant pump starting system is energized.
2. The audible alarm may be silenced by means of the externally mounted, push-to-silence button.
3. Visual alarm remains illuminated until the sewage level in the wet-well drops below the “off” setting of the alarm pressure switch.

D. The visual alarm lamp shall be inside a red, oblong lens at least 3.75" L x 2.38" W x 1.5" H. Visual alarm shall be mounted to the top of the enclosure in such a manner as to maintain NEMA 4X rating. The audible alarm shall be externally mounted on the bottom of the enclosure, capable of 93 dB @ 2 feet. The audible alarm shall be capable of being deactivated by depressing a push-type switch that is encapsulated in a weatherproof silicone boot and mounted on the bottom of the enclosure (push-to-silence button).

E. The high-level alarm system shall operate as follows:

1. The panel will go into alarm mode if either pump’s alarm switch closes. During the initial alarm mode pumps will run and the alarm light and buzzer will be delayed for a period of time based on user settings (default is 3-1/2 minutes). If the station is still in

high-level alarm after the delay, the light and buzzer will be activated.

2. The audible alarm may be silenced by means of the externally mounted push-to-silence button.
3. The visual alarm remains illuminated until the sewage level in the wet well drops below the "off" setting of the alarm switch for the pump(s).

F. The entire alarm panel, as manufactured and including any of the following options, shall be listed by Underwriters Laboratories, Inc.:

1. Alarm Activated Dry Contacts – Normally open relay contact closes upon alarm activation.
2. Alarm Activated Contacts for Remote Indoor Alarm Module – Will work with or without power to the alarm panel and is designed to work with E/One's Remote Sentry.
3. Includes Inner Door Dead Front.
4. Separate LED's for each condition.

G. The entire alarm panel shall provide protection from the following operating conditions:

1. Low Voltage (Brownout) Protection – A lockout cycle will prevent the motor from operating and will illuminate the Trouble LED if:

    a. incoming AC Mains voltage drops below a predetermined minimum, typically 12% of nameplate (211 volts for a 240 volt system) for 2 to 3 seconds, regardless of whether the motor is running
    b. lockout cycle will end if the incoming AC Mains voltage returns to a predetermined value, typically 10% of nameplate (216 volts for a 240 volt system).
    c. The system shall continue to retest the voltage every second indefinitely. If the lockout cycle has been initiated and the voltage comes back above the predetermined starting voltage, the system will function normally. The Trouble LED remains illuminated during a Brownout condition and a corresponding Brownout message will be displayed on the LCD screen. The LED will turn off when the Brownout condition ends and the LCD message remains latched until the panel is reset. The audible and visual alarm will not be activated unless there is a high wastewater level in the tank.

2. Run Dry Protection – A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the wastewater level in the tank is below the pump inlet shroud. A corresponding Run Dry message will be displayed on the LCD screen. The condition is rechecked every 20 minutes and the LCD message remains latched. If the condition is satisfied, the pump is allowed to cycle normally and the Trouble LED will go out, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the visual alarm will be activated until the panel is reset or until there is one cycle of normal operation. If a high level condition is presented at any time, a pump run cycle will be activated.
3. High System Pressure Protection – A 20-minute lockout cycle will prevent the motor from operating and will illuminate the Trouble LED when the pressure in the discharge line is atypically high (closed valve or abnormal line plug). A corresponding Overpressure message will be displayed on the LCD screen. The condition is rechecked every 20 minutes. If the condition is satisfied, the pump is allowed to cycle normally and

the Trouble LED will turn off, but the LCD message remains latched. The LCD message will remain latched until the panel is reset. If the condition is not satisfied after 3 consecutive attempts, the pump is locked out indefinitely and the audible and visual alarm will be activated. The LCD message and alarms will remain latched until the condition is removed and the panel is reset.

H. In all of the above cases, if more than one error condition is presented, the LCD message depicting the most recent error condition will be displayed.

I. Protect Plus Features:

1. High/Low Voltage monitoring with Trouble indication
2. High/Low Wattage (wattage is used instead of current because it is a better indicator of pump performance) monitoring with Trouble indication
3. Extended Run Time monitoring with Trouble indication
4. Cycle/Event Counter
5. Run Time Counter (Hour Meter)
6. Run Time Limit — time adjustable, user-selected options: 10 minutes (default) to 120 minutes in 1-minute intervals
7. Power-up Delay — time adjustable, user-selected options: None (default), to 300 minutes in 1-minute intervals
8. Alarm Delay — time adjustable, user-selected options: zero to 10 minutes in 30-second increments; 4 minutes is default
9. System self-test diagnostic
10. User-selectable Alarm latch
11. User-selectable Protect Mode disable
12. User-selectable buzzer timer

J. Specific Duplex Protect Plus indicators and programming features shall include:

1. Ready LED to indicate AC power to the station is satisfactory
2. Pump Run LED to indicate pump is operating (LCD indicates which pump is running)
3. Trouble LED indicator and predictive Visual Alarm notification (“blinking” alarm lamp; clears on Normal cycle)
4. High Level Alarm LED indicator (LCD indicates which pump is in alarm)
5. Manual Run switch to manually activate pumps
6. Lead/Lag indication (LCD indicates which pump is lead)
7. Menu-driven programmable controller with navigation overlay-type buttons (Enter, Scroll, Up, Down)
8. Normal Operation LED and Mode button for Mode status
9. Pump Performance menu LED with LCD display of the following pump performance statistics:

    a. Real-time Voltage
    b. Real-time Amperage
    c. Real-time Wattage
    d. Minimum/Maximum/Average Voltage
    e. Minimum/Maximum/Average Amperage
    f. Minimum/Maximum/Average Wattage
    g. Minimum/Maximum Run-time

h. Average Run-time
i. Last Run-time
j. Cycle/Event Counter
k. Run Time Counter (Hour Meter)

10. Diagnostics Menu LED
11. Initialize System Menu LED
12. Run Limit Menu LED
13. Alarm Delay Menu LED
14. Power Delay Menu LED
15. Pump alternating options (no alternation, adjustable time based and test)
16. Pump alternating time options — 24 hours to 72 hours in 12-hour increments

K. Generator Receptacle and Auto Transfer – The alarm panel shall include a 20 amp, 250 VAC generator receptacle with a spring-loaded, gasketed cover suitably mounted to provide access for connection of an external generator while maintaining a NEMA 4X rating. An automatic transfer switch shall be provided, which automatically switches from AC power to generator power. Power shall be provided to the alarm panel through the generator receptacle whenever power is present at the receptacle, allowing the audible and visual alarms to function normally in generator mode. When power is no longer applied to the generator receptacle, the panel is automatically switched back to the AC Mains power. (No manual switching within the panel enclosure is necessary to switch from generator power back to AC Mains, so the mode cannot be inadvertently left in the generator position after pumping down the station in generator mode as is the case with a manual transfer switch).

2.11 SERVICEABILITY

A. The grinder pump core, including level sensor assembly, shall have two lifting hooks complete with lift-out harness connected to its top housing to facilitate easy core removal when necessary. The level sensor assembly must be easily removed from the pump assembly for service or replacement. All mechanical and electrical connections must provide easy disconnect capability for core unit removal and installation. Each EQD half must include a water-tight cover to protect the internal electrical pins while the EQD is unplugged. A pump push-to-run feature will be provided for field trouble shooting. The push-to-run feature must operate the pump even if the level sensor assembly has been removed from the pump assembly. All motor control components shall be mounted on a readily replaceable bracket for ease of field service.

2.12 OSHA CONFINED SPACE

A. All maintenance tasks for the grinder pump station must be possible without entry into the grinder pump station (as per OSHA 1910.146, permit-required confined spaces).

2.13 SAFETY

A. The grinder pump shall be free from electrical and fire hazards as required in a commercial and/or residential environments. As evidence of compliance with this requirement, the completely assembled and wired grinder pump station shall be listed by Underwriters Laboratories, Inc. to be safe and appropriate for the intended use. UL listing of components of the station, or third-party testing to UL standard are not acceptable.

B. The grinder pump shall meet accepted standards for plumbing equipment for use in or near residences and/or commercial establishments, shall be free from noise, odor, or health hazards, and shall have been tested by an independent laboratory to certify its capability to perform as specified in either individual or low-pressure sewer system applications. As evidence of compliance with this requirement, the grinder pump shall bear the seal of NSF International. Third-party testing to NSF standard is not acceptable.

PART 3 - EXECUTION

3.1 FACTORY TEST

A. Each grinder pump shall be submerged and operated for 5 minutes (minimum). Included in this procedure will be the testing of all ancillary components such as, the anti-siphon valve, check valve, discharge assembly and each unit's dedicated level controls and motor controls. All factory tests shall incorporate each of the above listed items. Actual appurtenances and controls which will be installed in the field shall be particular to the tested pump only. A common set of appurtenances and controls for all pumps is not acceptable. Certified test results shall be available upon request showing the operation of each grinder pump at two different points on its curve. Additional validation tests shall include: integral level control performance, continuity to ground and acoustic tests of the rotating components.

B. All completed stations shall be factory leak tested to assure the integrity of all joints, seams and penetrations. All necessary penetrations such as inlets, discharge fittings and cable connectors shall be included in this test along with their respective sealing means (grommets, gaskets etc.).

3.2 DELIVERY

A. All grinder pump units will be delivered to the job site 100 percent completely assembled, including testing, ready for installation. Field installation of the pump in tanks under 96 inches is not allowed. Field installation of the level sensor into the tank is not allowed. Grinder pump stations will be individually mounted on wooden pallets.

3.3 INSTALLATION

A. Earth excavation and backfilling are specified elsewhere in these Contract Documents but are also to be done as a part of the work under this section, including any necessary sheeting and bracing.

B. Contractor shall be responsible for handling groundwater to provide a firm, dry subgrade for the structure, and shall guard against flotation or other damage resulting from general water or flooding.

C. The grinder pump stations shall not be set into the excavation until the installation procedures and excavation have been approved by the Owner and/or Owner's Representative.

D. Remove packing material. User instructions must be given to the Owner. Hardware supplied with the unit, if required, will be used at installation. The basin will be supplied with a 6" inlet grommet for connecting the incoming sewer line. Appropriate inlet piping must be used. The basin may not be dropped, rolled or laid on its side for any reason.

E. Installation shall be accomplished so that 1 inch to 4 inches of accessway, below the bottom of

the lid, extends above the finished grade line. The finished grade shall slope away from the unit. The diameter of the excavated hole must be large enough to allow for the concrete anchor.

F. A 6-inch (minimum) layer of naturally rounded aggregate, clean and free flowing, with particle size of not less than 1/8" or more than 3/4" shall be used as bedding material under each unit.

G. A concrete anti-flotation collar, as detailed by the manufacturer, and sized according to the manufacturer's instructions, shall be required and shall be pre-cast to the grinder pump or poured in place. Each grinder pump station with its pre-cast anti-flotation collar shall have a minimum of three lifting eyes for loading and unloading purposes.

H. If the concrete is poured in place, the unit shall be leveled, and filled with water, to the bottom of the inlet, to help prevent the unit from shifting while the concrete is being poured. The concrete must be manually vibrated to ensure there are no voids. If it is necessary to pour the concrete to a level higher than the inlet piping, an 8" sleeve is required over the inlet prior to the concrete being poured.

I. Pipe shall be stored on clean, level ground to prevent undue scratching or gouging of the pipe. If the pipe must be stacked for storage, such stacking should be in accordance with the pipe manufacturer's recommendations. The pipe should be handled in such a manner that it is not damaged by being dragged over sharp objects or cut by chokers or lifting equipment.

J. Segments of pipe having cuts or gouges in excess of 10 percent of the wall thickness of the pipe shall be cut out and removed. The undamaged portions of the pipe shall be rejoined using the butt fusion joining method. Sections of polyethylene pipe should be joined into continuous lengths on the job site above ground. The joining method shall be the butt-fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt-fusion equipment used in the joining procedure shall be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, fusion temperature, alignment, and fusion pressure.

K. Fused segments of pipe shall be handled so as to avoid damage to the pipe. When lifting fused sections of pipe, chains or cable-type chokers should be avoided. Nylon slings are preferred. Spreader bars should be used when lifting long, fused sections. Care should be exercised to avoid cutting or gouging the pipe.

L. The trench and trench bottom should be constructed in accordance with ASTM D 2321. Embedment materials should be Class I, Class II or Class III materials as defined in ASTM D 2321. The use of Class IV and/or Class V materials for embedment is not recommended and should be allowed. Bedding of the pipe should be performed in accordance with ASTM D 2321. Compaction should be as specified in ASTM D 2321.

M. Haunching and initial backfill should be as specified in ASTM D 2321 using Class I, Class II or Class III materials. ASTM D 2321 sections titled "Minimum Cover for Load Application," "Use of Compaction Equipment" and "Removal of Trench Protection" should apply unless otherwise directed.

N. The electrical enclosure shall be furnished, installed and wired to the grinder pump station by the Contractor. An alarm device is required on every installation. It will be the responsibility of the Contractor and the Owner to coordinate with the individual property owner(s) to determine

the optimum location for the Alarm Panel.

O. The Contractor shall mount the alarm device in a conspicuous location, as per national and local codes. The alarm panel will be connected to the grinder pump station by a length of 6-conductor type TC cable. The power and alarm circuits must be on separate power circuits. The grinder pump stations will be provided with 32 feet (minimum), 25 feet (minimum) of useable, electrical supply cable to connect the station to the alarm panel. This cable shall be supplied with a factory installed EQD half to connect to the mating EQD half on the core.

3.4 BACKFILL REQUIREMENTS

A. Contractor shall provide backfill material to surround the unit to grade using Class I or Class II backfill material as defined in ASTM 2321. Class 1A and Class 1B are recommended where frost heave is a concern. Class 1B is recommended when the native soil is sand or if a high, fluctuating water table is expected. Class 1, angular crushed stone, does not require compaction.

B. Class II, naturally rounded stone, shall require tamping, to achieve proper density. If native soil conditions consists of clean compactible soil, with less than 12 percent fines, free of ice, rocks, roots and organic material, it shall be an acceptable backfill. Soil must be compacted in lifts not to exceed one foot to reach a final Proctor Density of between 90 percent and 95 percent. Heavy, non-compactible clays and silts are not suitable backfill.

C. Backfill of clean native earth, free of rocks, roots, and foreign objects shall be thoroughly compacted in lifts not exceeding 12" to a final Proctor Density of not less than 90 percent. The grinder pump station shall be installed at a minimum depth from grade to the top of the 1 1/4" discharge line, to assure maximum frost protection. The finish grade line shall be 1" to 4" below the bottom of the lid, and final grade shall slope away from the grinder pump station.

D. Contractor shall provide all restoration. Restoration shall be included in the Contractor’s bid price for the individual grinder pump stations. The properties shall be restored to their original condition in all respects, including, but not limited to, curb and sidewalk replacement, landscaping, loaming and seeding, and restoration of the traveled ways, as directed by the Owner.

3.5 START-UP AND FIELD TESTING

A. Contractor shall provide the services of a qualified factory trained technician who shall inspect the placement and wiring of each station, perform field tests as specified herein, and instruct the Owner in the operation and maintenance of the equipment before the stations are accepted by the Owner.

B. Contractor shall be responsible for all equipment and materials necessary to perform testing. This shall include, as a minimum, a portable generator and power cable (if temporary power is required), water in each basin (filled to a depth sufficient to verify the high level alarm is operating), and opening of all valves in the system. These steps shall be completed prior to the qualified factory trained technician(s) arrival on site.

C. The services of a trained factory-authorized technician shall be provided for one (1) 8-hour day per grinder pump station installation.

D. Upon completion of the installation, the authorized factory technician(s) will perform the following test on each station:

1. Make certain the discharge shut-off valve in the station is fully open.
2. Turn ON the alarm power circuit and verify the alarm is functioning properly.
3. Fill the wet well with water to a depth sufficient to verify the high level alarm is operating. Shut off water.
4. Turn ON the pump power circuit. Initiate the pump operation to verify automatic "on/off" controls are operative. The pump should immediately turn ON. Within one (1) minute alarm light will turn OFF. Within three (3) minutes pump will turn OFF.
5. Consult the Manufacturer's Service Manual for detailed start-up procedures.

E. Upon completion of the start-up and testing, the manufacturer shall submit to the Owner the start-up authorization form describing the results of the tests performed for each grinder pump station. Final acceptance of the system will not occur until authorization forms have been received for each pump station installed and any installation deficiencies corrected.

3.6 SPARE CORE

A. Contractor shall supply one (1) spare grinder pump core, complete with all operational controls, level sensors, check valve, anti-siphon valve, pump/motor unit, and grinder per grinder pump station installation.

3.7 MANUALS

A. Contractor shall provide Owner one (1) manufacturer's Operation and Maintenance Manual for each grinder pump station installation.

END OF SECTION 11300

SECTION 15051 - BURIED PIPING INSTALLATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to install and test all buried piping, fittings, and specials. The Work includes the following:

a. All types and sizes of buried piping, except where buried piping installations are specified under other Sections.
b. Unless otherwise shown or specified, this Section includes all buried piping Work required, beginning at the outside face of structures or structure foundations, including piping beneath structures, and extending away from structures.
c. Work on or affecting existing buried piping.
d. Installation of all jointing and gasket materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, tie rods, cathodic protection, and other Work required for a complete, buried piping installation.
e. Supports, restraints, and thrust blocks.
f. Pipe encasements, with the exception of piping embedded in concrete within a structure or foundation.
g. Field quality control, including testing.
h. Cleaning and disinfecting.
i. Incorporation of valves, meters, and special items shown or specified into piping systems in accordance with the Contract Documents and as required.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before buried piping Work.
2. Coordinate with appropriate piping Sections of Division 15, Mechanical.
3. Notify other contractors in advance of installation of exposed piping to provide them with sufficient time for installation of items included in their contracts that must be installed with or before exposed piping Work.

C. Related Sections:

1. Section 02250 - Excavation Support and Protection
2. Section 02315 - Excavation and Backfill
3. Section 15064 - Plastic Pipe and Fittings

1.2 REFERENCES

A. Standards referenced in this Section are:

1. ASME Boiler and Pressure Vessel Code.
2. ASME B31.3, Process Piping.

3. American Society for Non-Destructive Testing (ASNT), ASNT-TC-1A, Recommended Practice, Personnel Qualification, and Certification in Non-destructive Testing.
4. ASTM B32, Specification for Solder Metal.
5. ASTM D2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
6. ASTM D4174, Practice for Cleaning, Flushing and Purification of Petroleum Fluid Hydraulic Systems.
7. ANSI/AWWA C105, Polyethylene Encasement for Ductile-Iron Pipe Systems.
8. ANSI/AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
9. ANSI/AWWA C150, Standard for Thickness Design of Ductile-Iron Pipe
10. ANSI/AWWA C151, Standard for Ductile-Iron Pipe, Centrifugally Cast
11. ANSI/AWWA C104, Standard for Cement–Mortar Lining for Ductile-Iron Pipe and Fittings
12. ANSI/AWWA C600, Installation of Ductile-Iron Water Mains and Their Appurtenances.
13. ANSI/AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.
14. ANSI/AWWA C606, Grooved and Shouldered Joints.
15. AWWA M23, PVC Pipe - Design and Installation.
16. AWWA M41, Ductile-Iron Pipe and Fittings.
17. ASCE 37, Design and Construction of Sanitary and Storm Sewers.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements:

1. Comply with requirements and recommendations of authorities having jurisdiction over the Work.
2. Obtain required permits for Work in roads, rights-of-way, railroads, and other areas of the Work.

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:

   a. Details of piping, specials, joints, harnessing and thrust blocks, and connections to piping, structures, equipment, and appurtenances. Submit engineering drawings (stamped and signed) indicating the design, location, materials of construction, concrete design, dimensional sizes, rebar cage construction, etc. for all pipe supports, restraints and thrust blocks for Owner's Representative for review.

2. Product Data: Manufacturer's literature and specifications, as applicable, for products specified in this Section.
3. Testing Procedures: Submit proposed testing procedures, methods, apparatus, and sequencing to Owner's Representative for informational purposes only and no less than two (2) weeks prior to scheduled testing. Notify and coordinate with Owner and Owner's Representative no less than seventy-two (72) hours prior to commencing testing. Contractor shall reschedule as necessary and at no additional cost to Owner, if Owner's operations and/or Owner staff are unable to accommodate Contractor's request.
4. Prior to undertaking any repairs, the Owner's Representative written approval of method and material to be used in the repair shall be obtained. Items which, in the opinion of the Owner's

Representative, cannot be repaired shall be replaced.

B. Informational Submittals: Submit the following:

1. Certifications: Certificate signed by manufacturer of each product certifying that product conforms to applicable referenced standards.
2. Field Quality Control Submittals: Results of each specified field quality control test.

C. Closeout Submittals: Submit the following:

1. Record Documentation:

a. Maintain accurate and up-to-date record documents showing modifications made in the field, in accordance with approved submittals, and other Contract modifications relative to buried piping Work. Submittal shall show actual location of all piping Work and appurtenances at same scale as the Drawings.
b. Show piping with elevations referenced to Project datum and dimensions from permanent structures. For each horizontal bend in piping, include dimensions to at least three permanent structures, when possible. For straight runs of piping provide offset dimensions as required to document piping location.
c. Include profile drawings with buried piping record documents when the Contract Documents include piping profile drawings.
d. Conform to Section 01710, Record Drawings and Closeout Procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work.
2. Upon delivery inspect pipe and appurtenances for cracking, gouging, chipping, denting, and other damage and immediately remove from Site and replace with acceptable material.

B. Storage:

1. Store materials to allow convenient access for inspection and identification. Store material aboveground using pallets, platforms, or other supports. Protect packaged materials from corrosion and deterioration.
2. Pipe and fittings other than PVC and CPVC may be stored outdoors without cover. Cover PVC and CPVC pipe and fittings stored outdoors.

C. Handling:

1. Handle pipe, fittings, specials, and accessories carefully in accordance with pipe manufacturer's recommendations. Do not drop or roll material off trucks. Do not drop, roll or skid piping.
2. Avoid unnecessary handling of pipe.
3. Keep pipe interiors free from dirt and foreign matter.
4. Protect interior linings and exterior coatings of pipe and fittings from damage. Replace pipe and fittings with damaged lining regardless of cause of damage.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Piping materials are specified in the Buried Piping Schedule at end of this Section. Piping materials shall conform to Specifications for each type of pipe and piping appurtenances in applicable Sections of Division 15, Mechanical.

B. General:

1. Pipe Markings:

a. Factory-mark each length of pipe and each fitting with designation conforming to those on approved laying schedules, if applicable.
b. Manufacturer shall cast or paint on each length of pipe and each fitting pipe material, diameter, and pressure or thickness class.

2.2 BURIED PIPING IDENTIFICATION

A. Polyethylene Underground Warning Tape for Metallic Pipelines:

1. Tracer tape shall be of inert, acid- and alkali-resistant, polyethylene, four mils thick, six inches wide, suitable for direct burial. Tape shall be capable of stretching to twice its original length.
2. Message shall read, "CAUTION [insert customized name of pipe service, i.e., "SANITARY SEWER" or other service as appropriate, as indicated in the Buried Pipe Schedule at the end of this Section] PIPE BURIED BELOW", with bold letters approximately two inches high. Messages shall be printed at maximum intervals of two feet. Tape color shall be green.
3. Manufacturer: Provide products of one of the following:

a. Brady Corporation.
b. Seton Identification Products.
c. Marking Services, Inc.
d. Or equal.

B. Detectable Underground Warning Tape for Non-Metallic Pipelines:

1. Tape shall be of inert, acid- and alkali-resistant, polyethylene, five mils thick, six inches wide, with aluminum backing, and have 15,000 psi tensile strength and 80 percent elongation capability. Tape shall be suitable for direct burial.
2. Message shall read, "CAUTION [insert customized name of pipe service, i.e., "SANITARY SEWER", or other appropriate service, as indicated in the Buried Pipe Schedule at the end of this Section] PIPE BURIED BELOW" with bold letters approximately two inches high. Messages shall be printed at maximum intervals of two feet. Tape color shall be green.
3. Manufacturer: Provide products of one of the following:

a. Brady Corporation.
b. Seton Identification Products.
c. Marking Services, Inc.
d. Or equal.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine conditions under which the Work is to be installed and notify Owner's Representative in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Install piping as shown, specified, and as recommended by pipe and fittings manufacturer.
2. In event of conflict between manufacturer's recommendations and the Contract Documents, request interpretation from Owner's Representative before proceeding.
3. Owner's Representative and Owner will observe excavations and bedding prior to laying pipe by Contractor. Provide written notification to Owner and Owner's Representative no less than 72 hours in advance of excavating, bedding, pipe laying, and backfilling operations.
4. Minimum cover over buried piping shall be four (4) feet, unless otherwise shown or directed by Owner's Representative.
5. Earthwork is specified in Section 02315, Excavation and Backfill.
6. Excavation in excess of that required or shown, and that is not authorized by Owner's Representative shall be filled at Contractor's expense with material furnished, placed, and compacted in accordance with Section 02315, Excavation and Backfill.
7. Comply with NFPA 24 for "Outside Protection", where applicable to water piping systems used for fire protection.
8. Comply with OSHA Standard, Title 29, Code of Federal Regulations, Part 1926, Section .650 (Subpart P - Excavations).

B. Separation of Sewers and Potable Water Piping:

1. Horizontal Separation:

a. Where possible, existing and proposed potable water mains and service lines, and sanitary, combined, and storm sewers shall be separated horizontally by clear distance of at least ten feet.
b. If local conditions preclude the specified clear horizontal separation, installation will be allowed if potable water main is in separate trench or on undistributed earth shelf on one side of sewer and with bottom of potable water main at least 18 inches above top of sewer.
c. Exception:

1) Where it is not possible to provide minimum horizontal separation described above, construct potable water main of cement-lined ductile iron pipe with restrained push-on joint or restrained mechanical joint pipe complying with public water supply design standards of authority having jurisdiction. Hydrostatically test water main and sewer as specified in this Section prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.

2. Vertical Separation:

a. Provide minimum vertical distance of 18 inches between outside of potable water main and outside of sewer when sewer crosses over potable water main.
b. Center a section of potable water main pipe at least 17.5 feet long over sewer so that sewer joints are equidistant from potable water main joints.
c. Provide adequate structural support where potable water main crosses under sewer. At minimum, provide compacted select backfill for ten feet on each side of crossing.
d. Exceptions:

1) Where it is not possible to provide minimum vertical separation described above, construct potable water main of cement-lined ductile iron pipe with restrained push-on joint or restrained mechanical joint pipe. Hydrostatically test water main and sewer as specified in this Section, prior to backfilling. Hydrostatic test pressure at crossing shall be at least 150 psi.
2) Encase either potable water main or sewer in watertight carrier pipe extending ten feet on each side of crossing, measured perpendicular to potable water main.

C. Plugs:

1. Temporarily plug installed pipe at end of each day of work or other interruption of pipe installation to prevent entry of animals, liquids, and persons into pipe, and entrance or insertion of deleterious materials into pipe.
2. Install standard plugs in bells at dead ends, tees, and crosses. Cap spigot and plain ends.
3. Fully secure and block plugs, caps, and bulkheads installed for testing to withstand specified test pressure.
4. Where plugging is required for phasing of the Work or subsequent connection of piping, install watertight, permanent type plugs, caps, or bulkhead acceptable to Owner's Representative.

D. Bedding Pipe: Bed pipe as specified and in accordance with details on the Drawings.

1. Trench excavation and backfill, and bedding materials shall conform to Section 02315, Excavation and Backfill, as applicable.
2. Contractor shall remove and replace existing unsuitable bedding materials with granular material furnished, placed, and compacted in accordance with Section 02315, Excavation and Backfill. Excavation and removal of existing unsuitable bedding material from the Site and providing for granular material shall be included in the Total Bid price.
3. Where pipe is installed in rock excavation, provide minimum of three inches of granular bedding material underneath pipe smaller than four-inch nominal diameter, and minimum of six inches of granular bedding material underneath pipes four-inch nominal diameter and larger.
4. Excavate trenches below bottom of pipe by amount shown and indicated in the Contract Documents. Remove loose and unsuitable material from bottom of trench.
5. Carefully and thoroughly compact pipe bedding with hand held vibratory compactors.
6. Do not lay pipe until Owner and Owner's Representative approves bedding condition based on independent compaction testing performed by special inspector paid for by Contractor under this Contract.
7. Do not bring pipe into position until preceding length of pipe has been bedded and secured in its final position.

E. Laying Pipe:

1. Conform to manufacturer's instructions and requirements of standards.

2. Install pipe accurately to line and grade shown and indicated in the Contract Documents, unless otherwise directed by Owner's Representative. Remove and reinstall pipes that are not installed correctly.
3. Slope piping uniformly between elevations shown.
4. Keep groundwater level in trench at least 24 inches below bottom of pipe before laying pipe. Do not lay pipe in water. Maintain dry trench conditions until jointing and backfilling are complete. Keep clean and protect interiors of pipe, fittings, valves, and appurtenances.
5. Start laying pipe at lowest point and proceed towards higher elevations, unless otherwise directed by Owner's Representative.
6. Place bell and spigot-type pipe so that bells face the direction of laying, unless otherwise directed by Owner's Representative.
7. Place concrete pipe containing elliptical reinforcement with minor axis of reinforcement in vertical position.
8. Excavate around joints in bedding and lay pipe so that pipe barrel bears uniformly on trench bottom.
9. Deflections at joints shall not exceed 75 percent of amount allowed by pipe manufacturer, unless otherwise directed by Owner's Representative.
10. For PVC and CPVC piping with solvent welded joints, 2.5-inch diameter and smaller, and copper tubing, snake piping in trench to compensate for thermal expansion and contraction.
11. Carefully examine pipe, fittings, valves, and specials for cracks, damage, and other defects while suspended above trench before installation. Immediately remove defective materials from the Site and replace with acceptable products.
12. Inspect interior of all pipe, fittings, valves, and specials and completely remove all dirt, gravel, sand, debris, and other foreign material from pipe interior and joint recesses before pipe and appurtenances are moved into excavation. Bell and spigot-type mating surfaces shall be thoroughly wire brushed, and wiped clean and dry immediately before pipe is laid.
13. Field cut pipe, where required, with machine specially designed for cutting the type of pipe being installed. Make cuts carefully, without damage to pipe, coating or lining, and with smooth end at right angles to axis of pipe. Cut ends on push-on joint type pipe shall be tapered and sharp edges filed off smooth. Do not flame-cut pipe.
14. Do not place blocking under pipe, unless otherwise directed by Owner's Representative for special conditions.
15. Touch up protective coatings in manner satisfactory to Owner's Representative prior to backfilling.
16. Notify Owner's Representative in advance of backfilling operations.
17. On steep slopes, take measures acceptable to Owner's Representative to prevent movement of pipe during installation.
18. Thrust Restraint: Where required, provide thrust restraint conforming to Article 3.4 of this Section.
19. Exercise care to avoid flotation when installing pipe in cast-in-place concrete, and in locations with high groundwater.

F. Backfilling:

1. Hydrostatically test sewer force main piping as specified in this Section, prior to backfilling and trench restoration.
2. Conform to applicable requirements of Section 02315, Excavation and Backfill.
3. Place backfill as Work progresses. Backfill by hand and do not use power tampers until pipe is covered by at least one foot of backfill.

3.3 TRACER TAPE INSTALLATION

A. Polyethylene Underground Warning Tape for Metallic Pipelines:

1. Provide polyethylene tracer tape for buried metallic piping, which includes pipe that is steel, ductile iron, cast iron, concrete, copper, and corrugated metal.
2. Provide tracer tape 12 to 18 inches below finished grade, above and parallel to buried pipe.
3. For pipelines buried eight feet or greater below finished grade, provide second line of magnetic tracer tape 2.5 feet above crown of buried pipe, aligned along pipe centerline.
4. Tape shall be spread flat with message side up before backfilling.

B. Detectable Underground Warning Tape for Non-Metallic Pipelines:

1. Provide polyethylene tracer tape with aluminum backing for buried, non-metallic piping, which includes pipe that is PVC, CPVC, polyethylene, HDPE, FRP, ABS, and vitrified clay.
2. Provide magnetic tracer tape 12 to 18 inches below finished grade, above and parallel to buried pipe.
3. For pipelines buried eight feet or greater below finished grade, provide second line of magnetic tracer tape 2.5 feet above crown of buried pipe, aligned along the pipe centerline.
4. Tape shall be spread flat with message side up before backfilling.

3.4 THRUST RESTRAINT

A. Provide thrust restraint on pressure piping systems where shown or indicated in the Contract Documents.

B. Thrust restraint may be accomplished by using restrained pipe joints, concrete thrust blocks, or harnessing buried pipe. Thrust restraints shall be designed for axial thrust exerted by test pressure specified in the Buried Piping Schedule at the end of this Section.

C. Place concrete thrust blocks against undisturbed soil. Where undisturbed soil does not exist, or for projects where the Site consists of backfill material, thrust restraint shall be provided by restrained pipe joints.

D. Restrained Pipe Joints:

1. Pipe joints shall be restrained by means suitable for the type of pipe being installed.

E. Concrete Thrust Blocks:

1. Provide concrete thrust blocks on pressure piping at changes in alignment of 45 degrees or more, at tees, plugs and caps, and where shown or indicated in the Contract Documents. Construct thrust blocks of Class B concrete.
2. Install thrust blocks against undisturbed soil. Place concrete so that pipe and fitting joints are accessible for repair.
3. Concrete thrust block size shall be as shown in the Contract Documents, unless otherwise directed by Owner's Representative.

F. Harnessed lengths of buried pipe shall be as shown in the Contract Documents.

3.5 WORK AFFECTING EXISTING PIPING

A. Location of Existing Underground Facilities:

1. Locations of existing Underground Facilities shown in the Contract Documents should be considered approximate. Mark outs shall be coordinated with Owner and Owner's Representative.
2. Determine the true location of existing Underground Facilities to which connections are to be made, crossed, and that could be disturbed, and determine location of Underground Facilities that could be disturbed during excavation and backfilling operations, or that may be affected by the Work.

B. Taking Existing Pipelines and Underground Facilities Out of Service:

1. Do not take pipelines or underground facilities out of service unless otherwise directed by Owner's Representative. Taking existing pipelines and underground facilities out of service may only be performed following submittal and approval of a MOPO Plan and shall require no less than 72 hours in advance written notice to Owner's Representative and Owner. Contractor shall coordinate with Owner operations no less than 72 hours in advance written notice to reschedule as necessary and at no additional cost to Owner, if Owner operations and/or Owner staff are unable to accommodate Contractor's request.

C. Work on Existing Pipelines or Underground Facilities:

1. Cut or tap piping or Underground Facilities as shown or required with machines specifically designed for cutting or tapping pipelines or Underground Facilities, as applicable.
2. Install temporary plugs to prevent entry of mud, dirt, water, and debris into pipe.
3. Provide necessary adapters, sleeves, fittings, pipe, and appurtenances required to complete the Work.

3.6 FIELD QUALITY CONTROL

A. General:

1. Test all piping, except as exempted in the Buried Piping Schedule in this Section. All sewer pipes and manholes must be clean prior to any work described in this section. They shall be free from dirt, debris, sand, stones, etc. and accumulated water must be removed.
2. Notify Owner's Representative and authorities having jurisdiction in writing at least 72 hours in advance of testing.
3. Conduct all tests in presence of Owner's Representative.
4. Remove or protect pipeline-mounted devices that could be damaged by testing.
5. Provide all apparatus and services required for testing, including:

    a. Test pumps, compressors, hoses, calibrated gages, meters, test containers, valves, fittings, and temporary pumping systems required to maintain Owner's operations.
    b. Temporary bulkheads, bracing, blocking, and thrust restraints.

6. Provide air if an air test is required, power if pumping is required, and gases if gases are required.

7. Owner shall provide access for Contractor to a source for fluids to be used for hydrostatic testing. If access to source provided by Owner is deemed inappropriate or inadequate by Contractor, it shall be the responsibility of the Contractor to bring in their own source of fluid for testing at their cost and at no additional cost to the Owner. Contractor shall provide means and methods to convey fluid for hydrostatic testing into piping being tested. Contractor shall provide fluid for other types of testing as required.
8. Repair observed leaks and repair pipe that fails to meet acceptance criteria. Retest after repair All tests and repairs shall be repeated as many times as necessary, at no additional cost to the Owner, until the specified requirements have been met.
9. Unless otherwise specified, testing shall include existing piping systems that connect with new piping system. Test existing pipe to nearest valve. Piping not installed by Contractor and that fails the test shall be repaired upon authorization of Owner. Unless otherwise included in the Work, repair of existing piping or Underground Facilities will be paid as extra Work except for the connection joint of new and existing old pipe.
10. Maximum length of pipeline testing shall be 1,000 linear feet.

B. Test Schedule:

1. Refer to the Buried Piping Schedule at the end of this Section for type of test required and required test pressure.
2. Unless otherwise specified, required test pressures are at lowest elevation of pipeline segment being tested.
3. For piping not listed in Buried Piping Schedule in this Section:

    a. Hydrostatically test pipe that will convey liquid at a pressure greater than five psig. Provide process air pipe test for pipe that will convey air or gas under pressure or vacuum, except chlorine gas, which requires separate test.
    b. Use exfiltration testing, low-pressure air testing, or vacuum testing for other piping.
    c. Disinfect for bacteriological testing piping that conveys potable water.

4. Test Pressure:

    a. Use test pressures listed in Buried Piping Schedule in this Section.
    b. If test pressure is not listed in Buried Piping Schedule, or if test is required for piping not listed in the Buried Piping Schedule, test pressure will be determined by Owner's Representative based on maximum anticipated sustained operating pressure and methods described in applicable ANSI/AWWA manual or standard that applies to the piping system.

C. Hydrostatic Testing:

1. Preparation for Testing:

    a. Follow procedures described in ANSI/AWWA Manual M9. Wetting period is not required for pipe that is not cement mortar-lined.
    b. Prior to testing, ensure that adequate thrust protection is in place and joints are properly installed.

2. Test Procedure:

a. Fill pipeline slowly to minimize air entrapment and surge pressures. Fill rate shall not exceed one foot of pipe length per second in pipe being tested.
b. Expel air from pipe as required.
c. Examine exposed joints and valves and make repairs to eliminate visible leakage.
d. After specified wetting period, add fluid as required to pressurize line to required test pressure. Maintain test pressure for a stabilization period of ten minutes before beginning test.
e. Timed test period shall not begin until after pipe has been filled, exposed to required wetting period, air has been expelled, and pressure stabilized.
f. Timed Test Period: After stabilization period, maintain test pressure for at least two hours. During timed testing period, add fluid as required to maintain pressure within five psig of required test pressure. For PVC and HDPE pipe, after three hour expansion phase, reduce test pressure by ten psig and do not add liquid. Test pressure shall then remain steady for one hour, indicating no leakage.
g. Pump from test container to maintain test pressure. Measure volume of fluid pumped from test container and record on test report. Record pressure at test pump at 15 minute intervals for duration of test.

3. Allowable Leakage Rates: Leakage is defined as the quantity of fluid supplied to pipe segment being tested to maintain pressure within five psi of test pressure during timed test period. Allowable leakage rates for piping are:

a. No Leakage: Pipe with flanged, welded, fused, threaded, soldered, or brazed joints.

3.7 CLEANING

A. Cleaning, General: Clean pipe systems as follows:

1. Thoroughly clean all piping, including flushing with water, dry air, or inert gas as required, prior to placing in service. Flush chlorine solution and sodium hypochlorite piping with water.
2. Piping 24-inch diameter and larger shall be inspected from inside and debris, dirt and foreign matter removed.
3. For piping that requires disinfection and has not been kept clean during storage or installation, swab each section individually before installation with five percent sodium hypochlorite solution.

B. Disinfection:

1. Disinfect all potable and finished water piping.
2. A suggested procedure for accomplishing complete and satisfactory disinfection is specified below. Other procedures may be considered for acceptance by Owner's Representative.

a. Prior to disinfection, clean piping as specified and flush thoroughly.
b. Conform to procedures described in ANSI/AWWA C651. Continuous feed method of disinfecting shall be used, unless alternative method is acceptable to Owner's Representative.

3. Water for initial flushing, testing, and disinfection will be furnished by Owner. Contractor shall provide all temporary piping, hose, valves, appurtenances, and services required. Cost of

water required for re-disinfection will be paid by Contractor to Owner at the water utility's standard rates.

4. Chlorine shall be provided by Contractor.
5. Bacteriologic tests will be performed by Owner. A certified test laboratory report will be provided to Contractor, if requested.
6. Chlorine concentration in the water entering the piping shall be between 50 and 100 ppm, such that a minimum residual concentration of 25 mg/l remains after a 24-hour retention period. Disinfect the piping and all related components. Repeat as necessary to provide complete disinfection.
7. After required retention period, the chlorinated water shall be flushed to a closed drain line, unless otherwise directed by Owner's Representative. Properly dispose of chlorinated water in accordance with applicable regulations. Do not discharge chlorinated water to storm sewers, ditches, or overland.

3.8 SCHEDULES

A. Schedules listed below are part of this Specification section.

1. Table 15051-A, Buried Piping Schedule.

TABLE 15051-A, BURIED PIPING SCHEDULE

Service	Dia. (inch)	Mat'l	Interior Lining	Exterior Coating	Pressure Class/ Thickness	Joint	Test	Remarks
SP	All	HDPE SDR 11	--	--	200	Fused	HYD (1.5 x Working Pressure or 150 psi, whichever is higher)	--

The following abbreviations are used in the Buried Piping Schedule.

A. Service Abbreviations

Service	Abbrev
Sanitary Piping	SP

B. Material Abbreviations

Material	Abbrev
Standard Dimension Ratio	SDR

C. Interior Lining Abbreviations

Coating	Abbrev

D. Coating Abbreviations

Coating	Abbrev

E. Joint Abbreviations

Joint Type	Abbrev
Restrained Mechanical Joint	RMJ

F. Test Abbreviations

Test	Abbrev
Hydrostatic Test (test pressure in psig)	HYD ( )

END OF SECTION 15051

NO TEXT THIS PAGE

SECTION 15064 – PLASTIC PIPE AND FITTINGS

PART 1 - GENERAL

1.1 SCOPE OF WORK

A. Contractor shall provide all labor, materials, tools, equipment and incidentals as required to furnish, install and test plastic piping, fittings and appurtenances at the locations as indicated in the Contract Documents and as specified herein.

B. Piping shall include all piping for sewer and similar wastewater conveyance structures.

C. Piping shall be located as shown in the Contract Documents. The Owner's Representative reserves the right to make such modifications in locations as may be found desirable to avoid interference between pipes or for other reasons. Pipe fitting notation is for the Contractor's convenience and does not relieve Contractor from installing and jointing different or additional items where required to achieve a complete piping system.

D. Where the word "pipe" is used it shall refer to pipe, fittings, or appurtenances, unless otherwise noted.

1.2 RELATED WORK

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. Excavation Support and Protection, Excavation and Backfill and Sanitary Manholes, Frames and Covers are included in Division 2.

C. Valves, mechanical piping and appurtenances and pipe hangers and supports are included in Division 15.

1.3 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, shop drawing and product data required to establish compliance with this Section. Submittals shall include the following:

1. Shop drawings including piping layouts and schedules shall be submitted to the Owner's Representative and shall include certified dimensioning drawings showing the locations of all fittings, valves and appurtenances, joint details (showing the manufacturer's allowable deflections), methods and locations of supports and all other pertinent technical specifications for all piping to be furnished.
2. Shop drawing submittals for piping under this Section shall include all data and information required for the complete piping systems. All dimensions shall be based on the actual equipment to be furnished. Types and locations of pipe hangers and/or supports shall be shown on the piping layout for each piping submittal.
3. Copies of the manufacturer's approved installation instructions for the types of joints being used.

4. Contractor shall furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section, certifying compliance with all reference standards and specification requirements.
5. Submit anticipated production and delivery schedule for duration of Project.

1.4 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM).

1. ASTM D1784 – Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds.
2. ASTM D1785 – Standard Specification for Poly (vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
3. ASTM D2241 – Standard Specification for PVC Pressure Rated Pipe
4. ASTM D2447 – Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80, Based on Outside Diameter.
5. ASTM D2464 – Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
6. ASTM D2466 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40.
7. ASTM D2467 – Standard Specification for Socket – Type Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80.
8. ASTM D2564 – Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems.
9. ASTM D2657 – Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.
10. ASTM D2665 – Standard Specification for Poly (Vinyl Chloride) (PVC) Plastic Drain, Waste and Vent Pipe Fittings.
11. ASTM D2855 – Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings.
12. ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals.
13. ASTM D3261 – Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Piping and Tubing.
14. ASTM D3311 – Standard Specification for Drain, Waste and Vent (DWV) Plastic Fittings Patterns.
15. ASTM F437 – Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
16. ASTM F438 – Standard Specification for Threaded Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40.
17. ASTM F439 – Standard Specification for Socket-Type Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80.
18. ASTM F441 – Standard Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe, Schedules 40 and 80.
19. ASTM F477 – Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
20. ASTM F493 – Standard Specification for Solvent Cements for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings.
21. ASTM F593 – Standard Specification for Stainless Steel Bolts, Hex Cap Screws and Studs.

22. ASTM F594 – Standard Specification for Stainless Steel Nuts.
23. AWWA C900 and C905 – Standard for PVC Pressure Pipe and Fabricated Fittings.
24. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
25. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter

B. American Water Works Association (AWWA)

1. AWWA C900 and C905 – Standard for PVC Pressure Pipe and Fabricated Fittings.

C. Plastic Pipe Institute (PPI)

1. PPI TR31 – Underground Installation of Polyolefin Piping.

D. American National Standard Institute (ANSI)

1. ANSI B16.5 Pipe Flanges and Flanged Fittings.

E. National Sanitation Foundation (NSF)

F. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.5 QUALITY ASSURANCE

A. All plastic pipe and fittings of each type shall be furnished by a single manufacturer who is experienced in the manufacture of the items to be furnished; however, it shall not be a requirement that the pipe and fittings be manufactured by the same manufacturer, provided that the pipe and fittings are compatible in both compounding and size. The pipe and fittings shall be designed, constructed and installed in accordance with the best practices and methods and shall be suitable for the intended service.

B. All plastic pipe and fittings shall be manufactured in the USA, using domestic materials, by an ISO 9001 certified manufacturer. All pipes shall be stored indoors after production at the manufacturing site until shipped from factory. This pipe shall carry the national Sanitation Foundation (NSF) seal of approval for potable water applications.

C. All plastic pipe and fittings to be installed under this Contract may be inspected at the plant for compliance with this Section by an independent testing laboratory selected by the Owner. Should any pipe not meet specification, Owner reserves the right to inspect by independent laboratory at plant of manufacture at no additional cost.

D. Inspection of the pipe and fittings will also be made by the Owner's Representative after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein, even though sample pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall be removed from the job.

E. Product marking shall meet the requirements of ASTM D2241 and shall include: the

manufacturers name (or the manufacturers trademark when privately labeled); the nominal pipe size; the outside diameter system; the material designation code; the applicable Standard thermoplastic pipe Dimension Ratio designation code (SDR number) and the corresponding pressure rating in psi for water @ 73° F; the ASTM designation D2241; and the independent laboratory's seal of approval.

1.6 DELIVERY, STORAGE AND HANDLING

A. Manufacturer shall package all pipe in a manner designed to deliver all piping to the site neatly, intact and without physical damage. Transportation carriers shall use appropriate methods and intermittent checks to insure all pipe is properly supported, stacked and restrained during transportation such that all pipe is not nicked, gouged, or physically damaged.

B. Care shall be taken in loading, transporting, and unloading to prevent damage to the pipe. Under no circumstances shall the pipe be dropped or skidded against each other. Slings, hooks, or pipe tongs shall be used in pipe handling.

C. All piping shall be stored on clean, level ground to prevent undue scratching or gouging. If piping must be stacked for storage, such stacking shall be done in accordance with the pipe manufacturer's written recommendations. All piping shall be handled in such a manner that it is not pulled over sharp objects or cut by chokers or lifting equipment. The interior of all pipes, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.

D. Pipe shall not be stacked higher than the limits recommended by its manufacturer. The bottom tier shall be kept off the ground on timbers, rails, or concrete. Stacking shall conform to manufacturer's recommendations.

E. Gaskets shall be placed in a cool location out of direct sunlight. Gaskets shall not come in contact with petroleum products. Gaskets shall be used on a first-in, first-out basis.

F. Sections of pipe having cuts or gouges in excess of 10% of the pipe wall thickness shall be cut out and removed. Undamaged portions of pipe shall be rejoined using heat fusion joining methods.

G. Refer to Section 01600 – Product Requirements for additional delivery, storage and handling requirements.

1.7 SYSTEM DESCRIPTION

A. Piping shall be installed in those locations as shown on the Contract Drawings.

B. The equipment and materials specified herein are intended to be standard types of plastic pipe and fittings for use in transporting wastewater, water, air and chemicals.

C. Plastic piping systems shall be designed for the following conditions:

System:	Force Main Piping
Material:	HDPE SDR 11
Fluids:	Sanitary Wastewater
Pressure:	Class 200 psi

Flow Velocity:	Up to 10 fps
Temperature:	35 to 100 degrees F

PART 2 - PRODUCTS

2.1 HDPE PIPE

A. Pipe shall be manufactured from PE4710 resin. The PE4710 material shall conforms to ASTM D3350 with cell classification of PE445574C and listed with the Plastic Pipe Institute's (PPI) TR4.

B. Pipe O.D. sizes 4" to 24" shall be available in both steel pipe sizes (IPS) and ductile iron pipe sizes (DIPS). Pipe O.D. sizes 26" to 54" shall be available in steel pipe sizes (IPS). Pipe shall have a manufacturing standard of ASTM D3350 and be manufactured by an ISO 9001 certified manufacturer. The pipe shall contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. The pipe shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

C. Each length of pipe (coils at 5 feet intervals) shall be marked to identify size, material type and grade, pressure rating, ASTM Designation, manufacturer, and NSF approval.

D. Pipe shall be of the size, SDR and pressure rating (PR) shown on the Contract Drawings.

E. Pipe shall be formulated with carbon black and/or ultraviolet stabilizer for maximum protection against UV rays for added assurance and resistant to most acids, bases, salts, aliphatic solutions, oxidants, and halogens.

F. Pipe dimensions shall be in accordance with ASTM F714 and AWWA C906.

2.2 HDPE FITTINGS

A. Butt Fusion

1. Butt fusion fittings shall be in accordance with ASTM D3261 and shall be manufactured by injection molding, a combination of extrusion and machining, or fabricated from HDPE pipe conforming to these specifications. All fittings shall be pressure rated to provide a working pressure rating no less than that of the pipe. Fabricated fittings shall be manufactured using a McElroy Datalogger to record fusion pressure and temperature. A graphic representation of the temperature and pressure data for all fusion joints made producing fittings shall be maintained as part of the quality control. Fittings shall be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

B. Electrofusion

1. Electrofusion fittings shall be PE4710 HDPE, cell classification of PE445574C, as determined by ASTM D3350 and be the same base resin as the pipe. Electrofusion fittings shall have a manufacturing standard of ASTM F1055.

C. Flanged and Mechanical Joint Adaptors

1. Flanged and mechanical joint adapters shall be PE4710 HDPE, cell classification of PE445574C, as determined by ASTM D3350 and be the same base resin as the pipe. Flanged and mechanical joint adapters shall have a manufacturing standard of ASTM D3216. All flanged and mechanical joint adapters shall be pressure rated to provide a working pressure rating no less than that of the pipe.

D. Mechanical Restraint

1. Mechanical restraint for HDPE may be provided by mechanical means separate from the mechanical joint gasket sealing gland. The restrainer shall provide wide, supportive contact around the full circumference of the pipe and be equal to the listed widths. Means of restraint shall be machined serrations on the inside surface of the restrainer equal to or greater than the listed serrations per inch and width. Loading of the restrainer shall be by a ductile iron follower that provides even circumferential loading over the entire restrainer. Design shall be such that restraint shall be increased with increases in line pressure.
2. Serrated restrainer shall be ductile iron ASTM A536-80 with a ductile iron follower; bolts and nuts shall be corrosive resistant, high strength alloy steel.
3. The restrainer shall have a pressure rating of, or equal to that of the pipe on which it is used or 150 psi, whichever is lesser. Restrainers shall be Sur-Grip, as manufactured by JCM Industries, Inc., or approved equal.

Nominal Size	Restraint Width	Serrations/Inch
4" & 6"	1 ½"	8
8", 10" & 12"	1 ¾"	8

E. Pipe stiffeners shall be used in conjunction with restrainers. The pipe stiffeners shall be designed to support the interior wall of the HDPE. The stiffeners shall support the pipe's end and control the "necking down" reaction to the pressure applied during normal installation. The pipe stiffeners shall be formed of 316 stainless steel to the HDPE manufacturers published average inside diameter of the specific size and DR of the HDPE. Stiffeners shall be as manufactured by JCM Industries, Inc., or approved equal.

2.3 SURFACE PREPARATION AND SHOP COATING

A. All piping and fittings exposed to view shall have its surface prepared and be shop painted, if applicable. Surface preparation and shop priming are a part of the work of this Section. Assist as required in identifying pipe contents, direction of flow and all else required for proper finish painting and marking of pipe.

PART 3 - EXECUTION

3.1 GENERAL

A. Care shall be taken in loading, transporting and unloading to prevent damage to the pipe. Pipe and fittings shall not be dropped. All pipe and fittings shall be examined before lying and no

piece shall be installed which is found to be defective.

B. If any defective pipe is discovered after it has been laid, it shall be removed and replaced with a sound pipe in a satisfactory manner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work and when installed or laid, shall conform to the lines and grades required.

C. Manufacturer recommendations shall be followed for pipe installation.

3.2 JOINING

A. Installation of plastic pipe shall be strictly in accordance with the manufacturer's technical data and printed instructions.

B. Butt Fusion

1. Contractor shall join sections of pipe into continuous lengths at the site aboveground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's written recommendations. The butt fusion equipment used in the joining procedures should be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 psi. The butt fusion joining shall produce a joint weld strength equal to or greater than the tensile strength of the pipe itself. All field welds shall be made with fusion equipment equipped with a McElroy Data Logger. Temperature, fusion pressure and a graphic representation of the fusion cycle shall be part of the quality control records.

C. Sidewall Fusion

1. Sidewall fusions for connections to outlet piping shall be performed in accordance with written HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion shall have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron shall be ¼- inch larger than the size of the outlet branch being fused.

D. Mechanical

1. Bolted joining may be used where the butt fusion method cannot be used. Flange joining will be accomplished by using a HDPE flange adapter with a ductile iron back-up ring. Mechanical joint joining shall be accomplished utilizing either a molded mechanical joint adapter or a combination of a Sur-Grip Restrainer and Pipe Stiffener, as manufactured by JCM Industries, Inc., or approved equal. Either mechanical joint joining method shall have a ductile iron mechanical joint gland.

E. Other

1. Socket fusion, hot gas fusion, threading, solvents, and epoxies shall not be an accepted method to join HDPE pipe.

3.3 QUALITY AND WORKMANSHIP

A. Pipe and/or fitting manufacturer's production facility shall be open for inspection by the Owner and/or Owner's Representative with a reasonable advance notice. During inspection, the manufacturer shall demonstrate that it has facilities capable of manufacturing and testing the pipe and/or fittings to the standards as specified herein.

3.4 FIELD TESTING

A. After installation, piping shall be tested for compliance as specified herein. Contractor shall provide all necessary tools, equipment (i.e., gauges, meters, pressure pumps and other equipment) and labor for the pressure test and leakage test on the pipelines.

B. Contractor shall submit detailed test procedures and methods to the Owner's Representative's for review at least 10 days prior to the test. Contractor shall notify Owner's Representative at least 3 days in advance of all testing activities.

C. All valves shall be properly located and installed and operable prior to testing. Bulkheads shall be provided with a sufficient number of outlets for filling and draining the line and for venting air. Contractor shall fill the pipeline slowly and perform the required hydrostatic pressure leakage tests.

D. Contractor shall coordinate with Owner to provide a source of potable water for Contractor's use in filling the lines. An air break shall be maintained at all times between the Owner's distribution system and the Contractor's equipment to prevent cross-connection. The line shall be slowly filled with water and the specified test pressure shall be maintained in the pipe for the entire test period by means of all necessary pumping equipment provided by the Contractor. Contractor shall provide accurate means for measuring the quantity of water required to maintain this pressure. The amount of water required is a measure of the leakage.

E. Pipeline shall be subjected to test pressure of 1.5 times system operating pressure (or not less than 150 psi, whichever is higher) for a period of not less than 2 hours. All leaks evident at the surface shall be repaired and leakage eliminated regardless of the total leakage as shown by test. Lines, which fail to meet tests, shall be replaced and/or repaired and retested as necessary until the test results are within the specified allowances with no additional cost to the Owner. Defective materials, pipes, valves and accessories shall be removed and replaced.

F. Testing shall be performed by slowly filling the piping system, expelling entrapped air from all high points. The fill rate shall be controlled so that the fluid velocity within the pipe system is less then 2 fps. Upon completion of the filling process, the system shall be brought up to the specified test temperature as applicable, holding the system pressure to less than 10 percent of the test pressure. Once the system has been stabilized at the specified test temperature, the pipe should be slowly brought up to the test pressure in such a manner so as to not create shock, surge or water hammer in the pipe system. The test duration time limit shall not begin until the full pressure specified above has been reached and the system has bee stabilized to within 5 percents of the test temperature. The system pressure and temperature shall be maintained to within ½ percent but no more than 5 percent of the specified value for the temperature and within 5 psi of the specified value for the pressure. These tolerances shall be held for the entire duration of the test. Upon completion of the test, the pressure shall be slowly removed by opening a valve or other pressure relieving device at a location remote to the location of the pressure/ temperature monitoring equipment.

G. The pressure test shall be monitored by a recording type pressure gauge for tests not requiring temperature control or a dual pen pressure/temperature recording gauge when temperature control is required. The entire test process shall be recorded, including the initial temperature stabilization and pressurization of the piping system. The record shall be continuous through the system test and shall show the final de-pressurization of the pipe system.

H. All visible leaks detected during the pressure test shall be repaired and the pressure/temperature test rerun. A successful test shall be a test in which no visible leaks are detected and the pipe system pressure can be maintained within ½ percent but no more the 5 psi of the specified value.

I. Prior to testing, the pipelines shall be supported in an approved manner to prevent movement during the tests.

3.5 CLEANING

A. At the conclusion of the Work, thoroughly clean all pipe by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. All debris shall be removed from the pipeline. The lowest segment outlet shall be flushed last to assure debris removal.

3.6 PAINTING

A. All pipe and fittings exposed to the direct sunlight shall be field painted to provide additional UV protection. This painting shall be required whether or not marking is required. All piping and fittings exposed to view shall have its surface prepared and be shop painted, if applicable. Surface preparation and shop priming are a part of the work of this Section. Assist as required in identifying pipe contents, direction of flow and all else required for proper finish painting and marking of pipe

3.7 WARRANTY

A. The equipment materials and products furnished under this section shall be guaranteed for a period of one (1) year from the date the equipment was placed into problem free operation against defective materials, designs and workmanship. Upon receipt of notice from Owner of failure of any part of the equipment, material or product during the guarantee period, the affected equipment, material or product shall be replaced or repaired promptly by and at the expense of the Contractor.

END OF SECTION 15064