ISSUED FOR BID

Design and Permitting of the Black Creek Water Resource Development Project

Raw Water Transmission Main Technical Specifications

St. Johns River Water Management District

May 2022

CDM Smith

TABLE OF CONTENTS

FDOT SPECIAL PROVISIONS

AMENDMENTS TO THE GENERAL CONDITIONS

DELETIONS, ADDITIONS, OR CHANGES TO SJRWMD GENERAL CONDITIONS:

The Florida Department of Transportation (FDOT) Standards, included in the construction documents, refer to the FDOT Standard Specifications for Road and Bridge Construction (July 2022 edition) and are available at the following website address:
http://www.fdot.gov/programmanagement/Implemented/SpecBooks/

FDOT design standards (FY 2017-18 edition) are available at the following website address:
https://www.fdot.gov/design/standardplans/ds.shtm

The **SPECIFICATIONS** provided in the Contract Documents are a supplement to the FDOT Standard Specifications. Every effort has been made to coordinate and not duplicate information provided. Should any discrepancies be identified between the two, the more restrictive specification shall apply.

Deletions, Additions, or Changes to the FDOT Standard Specifications:

- Delete Department where it appears and substitute District.
- Delete State of Florida where it appears and substitute SJRWMD.
- Where Engineer appears in the specifications, it shall be defined according to SJRWMD.

Delete Division I, Sections 2-6 of FDOT in its entirety.

Delete the following from Division I, Section 7 of FDOT:

- 7-1.9 "Florida Minority Business Loan Mobilization Program" in its entirety.
- 7-2.3 "As Built Drawings and Certified Surveys" in its entirety.
- 7-9 "Use of Explosives" in its entirety.
- 7-12 "Responsibility for Damages, Claims, etc." in its entirety.
- 7-13 "Insurance" in its entirety.
- 7-14 "Contractor's Responsibility for Work" in its entirety.
- 7-16 "Wage Rates for Federal-Aid Projects" in its entirety.
- 7-17 "Supplemental Agreements" in its entirety.
- 7-18 "Scales for Weighing Materials" in its entirety.
- 7-20 "Regulations of Air Pollutions from Asphalt Plants" in its entirety.
- 7-21 "Dredging and Filling" in its entirety.
- 7-22 "Available Funds" in its entirety.
- 7-24 "Disadvantaged Business Enterprise Program" in its entirety.
- 7-25 "On-The-Job Training Requirements" in its entirety.

- 7-26 "Cargo-Preference Act – Use of United States-Flag Vessels" in its entirety.

Delete Division I, Section 8 PROSECUTION AND PROGRESS and Division I, Section 9 MEASUREMENT AND PAYMENT in their entirety.

Delete Division II, Section 100 CONSTRUCTION EQUIPMENT-GENERAL REQUIREMENTS in its entirety.

Delete Division II, Section 101 MOBILIZATION in its entirety.

Delete Division II, Section 102-4 "Alternative Traffic Control Plan" in its entirety.

Change Division II, Section 102-5.11 "Work Zone Speed":
- Delete: ", or the Engineer may request the District Traffic Operation Engineer to investigate the need."

Change Division II, Section 102-6.2 "Construction":
- Keep first two paragraphs, delete remaining paragraphs starting with "When the Plans call…"

Delete Division II, Section 102-6.6 "Operation of Existing Movable Bridges" in its entirety.

Delete Division II, Section 102-12.2 "Contractor's Certification of Quantities" in its entirety.

Delete Division II, Section 102-13 "Basis of Payment" in its entirety.

Make the following Changes to Division II, Section 103-2 "Basis of Payment":
- Delete wording in this paragraph in its entirety.
- Replace it with: "Temporary work structures are considered part of the Contractor's overhead. No separate payment will be made by the District for temporary work structures."

Delete Division II, Section 104-9 "Method of Measurement" in its entirety.

Make the following Changes to Division II, Section 104-10 "Basis of Payment":
- Delete wording in this paragraph in its entirety.
- Replace with: "Erosion control work is considered part of the Contractor's overhead. No separate payment with be made by the District for erosion control work."

Delete Division II, Section 105 CONTRACTOR QUALITY CONTROL GENERAL REQUIREMENTS in its entirety.
Delete Division II, Section 107-3 "Method of Measurement" in its entirety.

Make the following Changes to Division II, Section 107-4 "Basis of Payment":

- Delete wording in this paragraph in its entirety.
- Replace with: "Litter removal and mowing work are considered part of the Contractor's overhead. No separate payment will be made by the District for litter removal and mowing work."

Delete Division II, Section 108-4 "Method of Measurement" in its entirety.

Make the following Changes to Division II, Section 108-4 "Basis of Payment":

- Delete wording in this paragraph in its entirety.
- Replace with: "Monitoring existing structures is considered part of the Contractor's overhead. No separate payment will be made by the District for monitoring existing structures."

SPECIAL CONDITIONS

The contractor shall be responsible for providing final as-builts drawings and survey control.

SECTION 01001
GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE AND INTENT

A. Description

1. The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract. The summary of the work is presented in Section 01010.

B. Work Included

1. The Contractor shall furnish all labor, superintendence, materials, power, light, heat, fuel, tools, appliances, equipment, supplies, and other means of construction necessary or proper for performing and completing the work. The Contractor shall obtain and pay for all required permits. The Contractor shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the Engineer and District, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all costs incidental thereto. The Contractor shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

2. The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made therefore.

3. The Contractor shall provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer and District, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of their workmanship, materials and equipment, prior approval of the Engineer and District notwithstanding.

4. The Contractor shall remove, demolish and dispose of all equipment, piping, asphalt, rock and appurtenances as shown on the Drawings and required to complete the work. No additional payment will be made for additional demolition or disposal work, not specifically specified on the plans as required, to complete the work.

5. The Contractor shall perform all work in accordance with applicable local, state, and federal codes and regulations.

C. Public Utility Installations and Structures

1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto whether owned or controlled by the District,

other governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage, water or other public or private property which may be affected by the work shall be deemed included hereunder.

2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. These data are not guaranteed as to their completeness or accuracy and it is the responsibility of the Contractor to make his own investigations to inform himself fully of the character, condition and extent of all such installations and structures as may be encountered and as may affect the construction operations.

3. The Contractor shall protect all public utility installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the Engineer. The Contractor shall so arrange his operations as to avoid any damage to these facilities. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor which are shown on the Plans or have been located in the field by the utility shall be repaired by the Contractor, at his expense, as directed by the Engineer. No separate payment shall be made for such protection or repairs to public utility installations or structures.

4. Public utility installations or structures owned or controlled by the District or other governmental body which are shown on the Drawings to be removed, relocated, replaced or rebuilt by the Contractor shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made therefore.

5. Where public utility installations or structures owned or controlled by the District or other governmental body are encountered during the course of the work, and are not indicated on the Drawings or in the Specifications, and when, in the opinion of the Engineer, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the Engineer, for the Contractor to accomplish. If such work is accomplished by the utility having jurisdiction it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be in accordance with the Contract Documents.

6. All District and other governmental utility departments and other owners of public utilities which may be affected by the work have been informed in writing by Engineer. Such notice will set out, in general, and direct attention to the responsibilities of the District and other governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the work and will be accompanied by one set of Drawings and Specifications covering the work under such Contract or Contracts.

7. In addition to the general notice given by the Engineer, the Contractor shall give written notice to District and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least one (1) week in advance of breaking ground in any area or on any unit of the work. This can be

accomplished by making the appropriate contact with the "Underground Facilities Location Service (1-800-432-4770)."

8. The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the Engineer.

1.02 DRAWINGS AND SPECIFICATIONS

A. Drawings

1. The Drawings referred to in the Contract Documents bear the general project name and number as shown in the Invitation to Bid (Advertisement).

2. When obtaining data and information from the Drawings, figures shall be used in preference to scaled dimensions, and large-scale drawings in preference to small scale drawings.

B. Copies Furnished to Contractor

1. After the Contract has been executed, the Contractor will be furnished with two hard copy sets of paper prints, the same size as the original drawings, of each sheet of the Drawings and two hard copies of the Specifications. Electronic copies, in PDF format, of the Drawings and Specifications are also available upon request.

2. The Contractor shall furnish each of the subcontractors, manufacturers, and material suppliers such copies of the Contract Documents as may be required for their work.

C. Supplementary Drawings

1. When, in the opinion of the Engineer, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications pertaining thereto, will be prepared by the Engineer and two paper prints thereof will be given to the Contractor.

D. Contractor to Check Drawings and Data

1. Contractor shall verify all dimensions, quantities and details shown on the Drawings, Supplementary Drawings, Schedules, Specifications or other data received from the Engineer, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. The Contractor will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the Engineer, should such errors or omissions be discovered. All schedules are given for the convenience of the Engineer, District and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

E. Specifications

1. The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the work. Products and Execution modify and supplement these by detailed requirements for the work and shall always govern whenever there appears to be a conflict.

2. The Technical Specifications are to be used in conjunction with the FDOT Standard Specifications for Road and Bridge Construction (July 2022 edition). Every effort has been made to coordinate and not duplicate information provided. Should any discrepancies be identified between the two, the more restrictive specification shall apply.

F. Intent

1. All work called for in the Specifications applicable to this Contract, but not shown on the Drawings in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Drawings or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

2. The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

3. The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

1.03 MATERIALS

A. Manufacturer

1. The names of proposed manufacturers, material, suppliers and dealers who are to furnish materials shall be submitted to the Engineer for approval. Such approval must be obtained before shop drawings will be checked. No manufacturer will be approved for any materials to be furnished under this Contract unless they shall be of good reputation and have a plant of ample capacity. The Contractor shall, upon the request of the Engineer, be required to submit evidence that he has manufactured a similar product to the one specified and that it has been previously used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.

2. All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the Engineer, that the manufacturer or subcontractor deal directly with the Engineer. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

3. Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.

B. Delivery

1. The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete the work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

2. The Contractor shall deliver materials and equipment in Manufacturer's original unopened and undamaged containers with legible labeling. Materials and equipment shall be stored in such manner as to prevent damage from environment and construction operations. Handling shall be in accordance with Manufacturer's requirements.

1.04 INSPECTION AND TESTING

A. General

1. Inspection and testing of materials will be performed by the Contractor unless otherwise specified.

2. For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Two copies of the reports shall be submitted and authoritative certification thereof must be furnished to the Engineer as a prerequisite for the acceptance of any material or equipment.

3. If, in the making of any test of any materials, it is ascertained by the Engineer that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said materials or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the District.

B. Costs

1. All inspection and testing of materials furnished under this Contract will be performed by the Contractor or duly authorized inspection engineer or inspection bureaus in accordance with appropriate bid items.

2. Materials submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the District for compliance. The Contractor shall reimburse the District for the expenditures incurred in making such tests on materials which are rejected for non-compliance.

C. Inspection of Materials

1. The Contractor shall give notice in writing to the Engineer, sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the Engineer will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor

that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture

1. When inspection is waived or when the Engineer so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

E. Final Field Tests

1. Upon completion of the work and prior to final payment, all materials installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

2. The Contractor shall furnish labor, fuel, energy, and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the District. The Furnishing Supplier shall assist in the final field tests as applicable.

F. Failure of Tests

1. Any defects in the materials or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor by replacements or otherwise. The decision of the Engineer and District as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials, when tested, shall again fail to meet the guarantees or specified requirements, the District, notwithstanding its partial payment for work, and materials, may reject the materials and may order the Contractor to remove them from the site at his own expense.

2. In case the District rejects any materials, then the Contractor shall replace the rejected materials within a reasonable time. If he fails to do so, the District may, after the expiration of a period of 30 calendar days after giving him notice in writing, proceed to replace such rejected materials, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his Contract.

G. Final Inspection

1. During such final inspections, the work shall be clean and free from water. In no case will the final estimate be prepared until the Contractor has complied with all requirements set forth and the Engineer and District have made their final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

1.05 TEMPORARY STRUCTURES

A. Responsibility for Temporary Structures

1. In accepting the Contract, the Contractor assumes full responsibility for the sufficiency and safety of all temporary structures or work and for any damage which may result from their failure or their improper construction, maintenance or operation and will indemnify and save harmless the District from all claims, suits or actions and damages or costs of every description arising by reason of failure to comply with the above provisions.

1.06 SAFETY

A. Accident Prevention

1. Precautions shall be exercised at all times for the protection of person and property. The safety provisions of applicable laws, building and construction codes shall be observed. The Contractor shall comply with the U.S. Department of Labor Safety and Health Regulations for construction promulgated under the Occupational Safety and Health Act of 1970 (PL 91-596), and under Section 107 of the contract Work Hours and Safety Standards Act (PL-54), except where state and local safety standards exceed the federal requirements and except where state safety standards have been approved by the Secretary of Labor in accordance with provisions of the Occupational Safety and Health Act, shall be complied with.

B. First Aid

1. The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when people are employed on the work.

1.07 LINES AND GRADES

A. Grade

1. All work under this Contract shall be constructed in accordance with the lines and grades shown on the Drawings, or as approved by the Engineer. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

2. The Engineer has established benchmarks as shown on the drawings. Reference marks for lines and grades as the work progresses will be located in such a manner by the Contractor as to cause as little inconvenience to the prosecution of the work as possible. The Contractor shall so place excavation and other materials as to cause no inconvenience in the use of the reference marks provided. The Contractor shall remove any obstructions placed by him contrary to this provision.

B. Surveys

1. The Contractor shall furnish and maintain, at his own expense, stakes and other such materials, and give such assistance, including qualified helpers, as may be required by the Engineer for setting reference marks. The Contractor shall check such reference marks by such means as he may deem necessary and, before using them, shall call the Engineer's

attention to any inaccuracies. The Contractor shall, at his own expense, establish all working or construction lines and grades as required from the reference marks set by the Engineer, and shall be solely responsible for the accuracy thereof.

C. Safeguarding Marks

1. Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or to removing without authorization such established points, stakes and marks.

2. The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

D. Datum Plane

1. All elevations indicated or specified refer to the North American Vertical Datum of 1988 (NAVD88).

1.08 ADJACENT STRUCTURES AND LANDSCAPING

A. Responsibility

1. The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Drawings, and the removal, relocation and reconstruction of such items called for on the Drawings or specified shall be included in the various Contract Items and no separate payments will be made therefore. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Drawings and when, in the opinion to avoid interference with the work, payment therefore will be made as provided for in the General Conditions.

2. Contractor is expressly advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.

3. Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, pools, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the District and to the satisfaction of the Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the Engineer and District.

4. Prior to the beginning of any excavations the Contractor shall advise the Engineer of all buildings or structures on which he intends to perform work or which performance of the project work will affect.

B. Lawn Areas

1. Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, restored with new sod, or left as bare soil in the manner described in these specifications or on the drawings.

1.09 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights

1. During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public, in accordance with state and local requirements.

B. Smoke Prevention

1. The Contractor shall use hard coal, coke, oil or gas as fuel for equipment generating steam. A strict compliance with ordinances regulating the production and emission of smoke will be required. No open fires will be permitted.

C. Noise

1. The Contractor shall eliminate noise to as great as extent as practicable at all times. Electric or quiet pumps shall be used as the primary to limit noise. Backup fuel powered pumps are acceptable. Air compressing plants shall be equipped with silencers and the exhaust of all gasoline motors or other power equipment shall be provided with mufflers. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

2. Sound levels shall not exceed 65dba during working hours. This sound level to be measured at the property line of the nearest residence and/or commercial structure. Sound levels in excess of these values are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the District for excessive noise shall not relieve the Contractor of the other potions of this specification including, but not limited to contract time and contract price.

3. If mufflers cannot achieve the necessary noise reduction, noise abatement shall be accomplished by the Contractor’s installation of baffles (or other acceptable means) positioned to break line-of-site from the noise source to affected residences and/or commercial structures. Minimum noise abatement measures shall consist of equipping all engines with hospital grade mufflers or silencers.

D. Access to Public Services

1. Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

E. Dust Prevention

1. The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

1.10 CUTTING AND PATCHING

A. The Contractor shall do all cutting, fitting or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the Engineer and in accordance with the Drawings and Specifications. The work must be done by competent workmen skilled in the trade required by the restoration.

1.11 CLEANING

A. During Construction

1. During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the Engineer, such material, debris, or rubbish constitutes a nuisance or is objectionable.

2. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

3. The Contractor shall be responsible and liable for all spillage and incur all associated costs including, but not limited to, costs related to repair and maintenance resulting from damages thereof.

B. Final Cleaning

1. At the conclusion of the work, all erection plant, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

2. The Contractor shall thoroughly clean all materials installed by him and shall deliver such materials undamaged and in a clean condition.

1.12 MISCELLANEOUS

A. Protection Against Siltation and Bank Erosion

1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches.

2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the Engineer or other agencies which results from his construction operations.

B. Existing Facilities

1. The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in these Specifications.

C. Use of Chemicals

1. All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

PART 2 PART 2 - PRODUCTS (NOT USED)

PART 3 PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01002
INFORMATION AVAILABLE TO BIDDERS

PART 1 GENERAL

1.01 REPORTS

A. The Engineer has relied upon a specific purpose survey by Woolpert, Inc and Southeastern Surveying and Mapping Corporation. The survey has been provided with the drawings. The Contractor may obtain additional copies of the survey at the cost of reproduction.

The survey is provided for the Contractor's convenience and is for general information only. The Contractor is solely responsible for his own interpretations of the data.

B. The Engineer has completed subsurface exploration and a geotechnical engineering investigation of the project area. An electronic copy, in PDF format, of the Geotechnical Report is included with the Contract Documents, but is for general information only and is not part of the Contract Documents. The Contractor is solely responsible for his own interpretations of the geotechnical data. The report is represented to only provide a general indication of the types of conditions likely to be found in the vicinity. The Contractor may at his own expense obtain additional geotechnical information.

1.02 UTILITIES

A. Existing utilities have been shown on the Drawings insofar as information is reasonably available; however, it will be the Contractor's responsibility to preserve all existing utilities whether shown on the Plans or not. If utility conflicts are encountered by the Contractor during construction, he shall give sufficient notice to their owners so that they may make the necessary adjustments. Damage to any utilities which, in the opinion of the District, is caused by carelessness on the part of the Contractor shall be repaired at the Contractor's expense. Any delays ensuing from this damage will be considered as inexcusable.

1.03 PERMITS OBTAINED BY THE DISTRICT

A. The following permits have been obtained by the District. A copy of these permits are available via the permitting agencies electronic database or a copy can be obtained from the District. The District will renew or file for a time extension of any expired permits. The Contractor is solely responsible for compliance to all conditions of the permits.

1. The Florida Department of Environmental Protection (FDEP) Environmental Resource Permit (ERP) - https://depedms.dep.state.fl.us:443/Oculus/servlet/shell?command=getEntity&[guid=23.11 35344.1]&[profile=Permitting_Authorization]

2. U.S. Army Corps of Engineers (ACOE) Section 404 (Clean Water Act) Individual Permit

3. Florida Department of Transportation (FDOT) Right-of-Way Utility Permit

1.04 EASEMENTS/AGREEMENTS OBTAINED BY THE DISTRICT

A. The District has obtained easements/agreements for this project and a copy of these easement/agreements will be provided to the Contractor by the District prior to issuance of the Effective Date of the Agreement. The Contractor is responsible for complying with and satisfying the conditions of the easement/agreements. See Sections 01014 and 01100, 1.15 for additional information and requirements for obtained easements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.01 LOCATION OF WORK

A. The work of this Contract is located within Clay County starting at the north side of State Road (SR) 16 at the Black Creek Intake Pump Station connection, proceeding west along the north side of SR 16, crossing to the south side of SR 16 just east of the intersection of SR16 and SR 21, proceeding west and crossing SR 21 to the west side of SR 21, continuing south/southwest along the west side of SR 21 to Treat Road, continuing along the north side of Treat Road, crossing Treat Road to the south side and continuing along the south side of Treat Road until reaching the project end point as shown on the Drawings.

1.02 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment, tools, services and incidentals required and complete all work required by these Specifications and as shown on the Drawings.

B. The Work includes, but is not necessarily limited to, the following:

1. Construct 30-inch raw water transmission main with all required appurtenances. Construction shall be via open–trench method, jack and bore method (for crossing FDOT roads) and horizontal directional drilling method (for crossing waterways and wetlands).

2. Perform all associated miscellaneous work, restoration and cleanup.

1.03 CONSTRUCTION AREAS

A. Contractor shall not use the construction work areas and FDOT right-of-way for storage. Material storage is the responsibility of the Contractor and shall be within the easements obtained by the District, staging areas approved by Camp Blanding (see Figures 1 through 5 in Section 01014) or at additional dedicated staging area(s) to be obtained by the Contractor at no additional cost to the District.

B. Coordinate use of work site under direction of Engineer.

C. Assume full responsibility for the protection and safekeeping of Products under this Contract, stored at the designated area.

D. Obtain and pay for the use of additional storage or work areas needed for operations.

1.04 PRE-CONSTRUCTION CONFERENCE

A. Within 10 days of the Effective Date of the Agreement, a joint meeting shall be held with representatives of the Contractor and major subcontractors, the Engineer, the District, and other invited parties or government agencies which may be affected by or have jurisdiction over the Project.

B. This meeting is intended to introduce the various key personnel from each organization and discuss the Contract Documents, the start of construction, order of work, labor and legal

requirements, insurance requirements, names of major subcontractors, method of payment, shop drawing requirements, protection of existing facilities and other pertinent items associated with the Project.

C. Within five (5) days of the Effective Date of the Agreement, the Contractor shall provide two hard copies and an electronic copy, in PDF format, of its proposed work schedule.

D. The Contractor shall coordinate with the SR-21 Road Resurfacing FDOT Project 443305-1 and submit, for FDOT approval, a Utility Work Schedule (UWS) that reflects said coordination. The Contractor shall update and maintain the UWS based on changes in either project phasing or schedule. The Contractor will not be entitled to any additional compensation for costs associated with its coordinating with the resurfacing projects' contractor(s) or any costs associated with delays incurred by the Contractor as a result of the resurfacing projects.

1.05 DISCREPANCY BETWEEN DRAWINGS AND SPECIFICATIONS

A. In case of any discrepancy between the Drawings and Specifications, the more stringent requirement shall apply. The Contractor will not be held responsible for the discovery of such discrepancy, but any work done on the item involved after such discovery, and prior to authorization by the Engineer and District, will be done at the Contractor’s risk and expense.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01014
CONSTRUCTION CONSTRAINTS

PART 1 GENERAL

1.01 DESCRIPTION

A. Areas of construction under this contract must be coordinated with Florida Department of Transportation, Clay County, Camp Blanding (Florida National Guard Facility) and private property owners to maintain access to their facilities and to allow construction to be completed.

B. Contractor shall coordinate for all utilities required during construction including power and potable water. The District has identified an existing fire hydrant in Keystone Heights owned by Clay County Utilities Authority (CCUA) located at the intersection of State Road 21 and Firetower Road. Additional details will be provided during the pre-bid meeting. Contractor may opt to locate additional water sources which may include negotiation with owners of nearby private wells or CCUA to obtain a potable water source and/or water required for pipeline flushing and pressure testing.

C. The District has negotiated with Camp Blanding the use of four staging areas. Each staging area requires clearing and improvements as shown in the attached Figures. Any vegetative clearing accomplished on Camp Blanding for the staging areas should plan to have all debris removed from site. Small ground cover may be mowed directly, but any large debris that is chipped or felled will need to be removed from site. The Contractor may utilize these staging areas or coordinate for the use of other construction staging areas. Camp Blanding is requesting that all improvements to the sites used (i.e. fence, gates, surface material improvement) be removed once the project is completed unless determined otherwise during the project. Camp Blanding's intent is to have the area returned to as near-to-natural as possible. Obtainment of additional staging areas, required for Horizontal Directional Drilling (HDD) and pipe string out areas required for the Work, are the responsibility of the Contractor. Costs associated with acquisition of additional staging areas, clearing, access and improvements of staging areas shall be the responsibility of the Contractor and shall be included in the Contractor's Bid.

D. Contractor shall coordinate with Camp Blanding for access to Work areas and staging areas and shall comply with all security and access requirements including all documentation required for such access. Contractor's failure to maintain secured fencing and access will result in the loss of and requirement to immediately vacate the Camp Blanding staging areas. Contractor will be required to install perimeter fencing inside Camp Blanding around it staging area(s) and install a separate exterior gate to the highway. Contractor's use of Camp Blanding's gates is limited to the time needed to install its perimeter fencing and gate. Camp Blanding's gates must remain closed at all times or manned while open Contractor's failure to maintain secured fencing and access will result in the loss of access and requirement to immediately vacate the easement areas.

E. The District will perform a pre-construction gopher tortoise survey within the entire Work area. Silt fence installation and on-site relocation of gopher tortoises, by the District, shall commence immediately upon completion of Pre-construction survey.

F. The Work will occur concurrently with the SR-21 Roadway Resurfacing FDOT Project 443305-1. Scheduling coordination with FDOT projects will be required and impacts must be considered during schedule development. The Contractor shall submit, for FDOT approval, a

Utility Work Schedule (UWS) that reflects said coordination. Contractor shall update and maintain the UWS based on changes in either project phasing or schedule.

G. The SR-21 Roadway Resurfacing FDOT Project 443305-1 includes roadway widening and associated tree removal in the vicinity of Gold Head State Park. Contractor shall coordinate Work schedule to allow for tree removal and roadway widening to occur prior to Work in this area.

H. Existing utilities include a Florida Gas Transmission (FGT) gas main which is located within a dedicated FGT easement as depicted on the Drawings. Contractor shall comply with the following requirements for all Work required within the Florida Gas easement.

1. Any encroachment consented to by FGT shall not interfere with the operation, maintenance, and access of FGT's pipeline facilities, including but not limited to, close interval surveys; leak detection surveys; pipeline patrol, pipeline marking and similar activities.

2. Contractor shall provide a minimum of 48 hours' notice to FGT prior to any installation, construction, excavation, or demolition work on the easement area. To ensure further safety, Contractor must call appropriate ONE CALL for a locate by calling 811. An FGT representative must be present when any work is done within the easement area. The onsite FGT representative will have the authority to shutdown work by the Contractor if the Contractor's activities are judged to be unsafe by the FGT representative. The FGT representative will be invited to participate in Contractor's safety meetings. This provision applies each time FGT's pipeline facilities are crossed.

3. Existing ground elevation is to be maintained.

4. For vehicles and/or construction equipment requesting approval to cross FGT's facilities, each crossing location will be reviewed on a case-by-case, site-specific basis and will require the surveyed elevation of the pipeline and/or facility verified by an FGT field representative to be performed by the party requesting the crossing encroachment and submitted to FGT. The execution of a wheel load calculation must be completed and approved by FGT prior to crossing FGT's facilities for every vehicle and/or construction equipment requesting to cross. FGT may require matting or other suitable material be installed to achieve the necessary support for such crossing. This too will be site specific and case-by-case only.

5. When crossing an FGT pipeline (via drill or open lay) Contractor must visually verify the elevation of the pipeline both vertically and horizontally, by an FGT approved method such as vacuum excavation with an FGT field representative on-site at all times during this operation. When using directional drill method, a minimum vertical clearance of 10 feet from the pipeline is required across the entire easement.

6. Where the encroachment includes utilities, all such utilities crossing the easement area must have a minimum separation of 24 inches between the utility and the FGT pipeline(s) at the point of crossing and must cross at a 90-degree angle. No utilities shall be constructed between the surface of the easement area and the top of the subsurface pipeline facilities unless agreed to in writing by FGT. No parallel utilities, structures, and/or appurtenances are permitted within the easement area.

7. No roto-mixing or vibrating machinery is allowed within the easement area.

8. Excavations that expose the FGT pipeline must follow OSHA standards. Time will be allowed for a FGT representative to inspect and make coating repairs as the subsurface pipeline facilities are exposed.

9. Twelve inches (12") of backfill around the subsurface pipeline facilities shall be sand or clean fill; free of rocks and debris.

10. With prior approval, no more than twenty feet (20') of pipe shall be exposed at any given time; if more than twenty feet (20') of pipe is to be exposed, all Standard Operating Procedures (SOP) must be adhered to, pressure reductions must be scheduled at least one year in advance and engineering stress calculations must be performed by FGT Engineering and approved by FGT management prior to allowing any more than the twenty feet (20') of exposed pipe.

11. With prior approval and an FGT representative on site at all times, excavation equipment equipped with toothless buckets may be allowed to dig or excavate within three feet of the pipeline facilities. All other construction/excavation equipment will not be allowed to perform any excavation within three feet of the pipeline facilities. All mechanical excavation performed within three feet of the pipeline will be performed parallel to the pipeline (i.e., track-hoe may not reach over the pipeline to dig on the opposite side of the pipeline).

12. All excavation within 24 inches from the top or 36 inches from the side or bottom of the pipeline shall be by manual means. After top exposure, excavation up to 24 inches from the side or bottom of the exposed pipeline may proceed by mechanical means if the FGT representative is satisfied it may be done safely with the equipment and operator available.

13. Barriers adequate to prevent vehicular damage to any exposed pipeline facilities shall be installed and maintained at all times.

14. All FGT pipeline facilities, cathodic protection equipment, and test lead wires shall be protected from damage by construction activity at all times.

15. No installation, construction, excavation, or demolition work shall be performed within the easement area on weekends or holidays.

16. The Contractor shall provide and install temporary construction fence along the easement boundaries for the entire length of the proposed work area to preserve and protect the pipeline(s). The fence must be maintained for the duration of the development or construction activity.

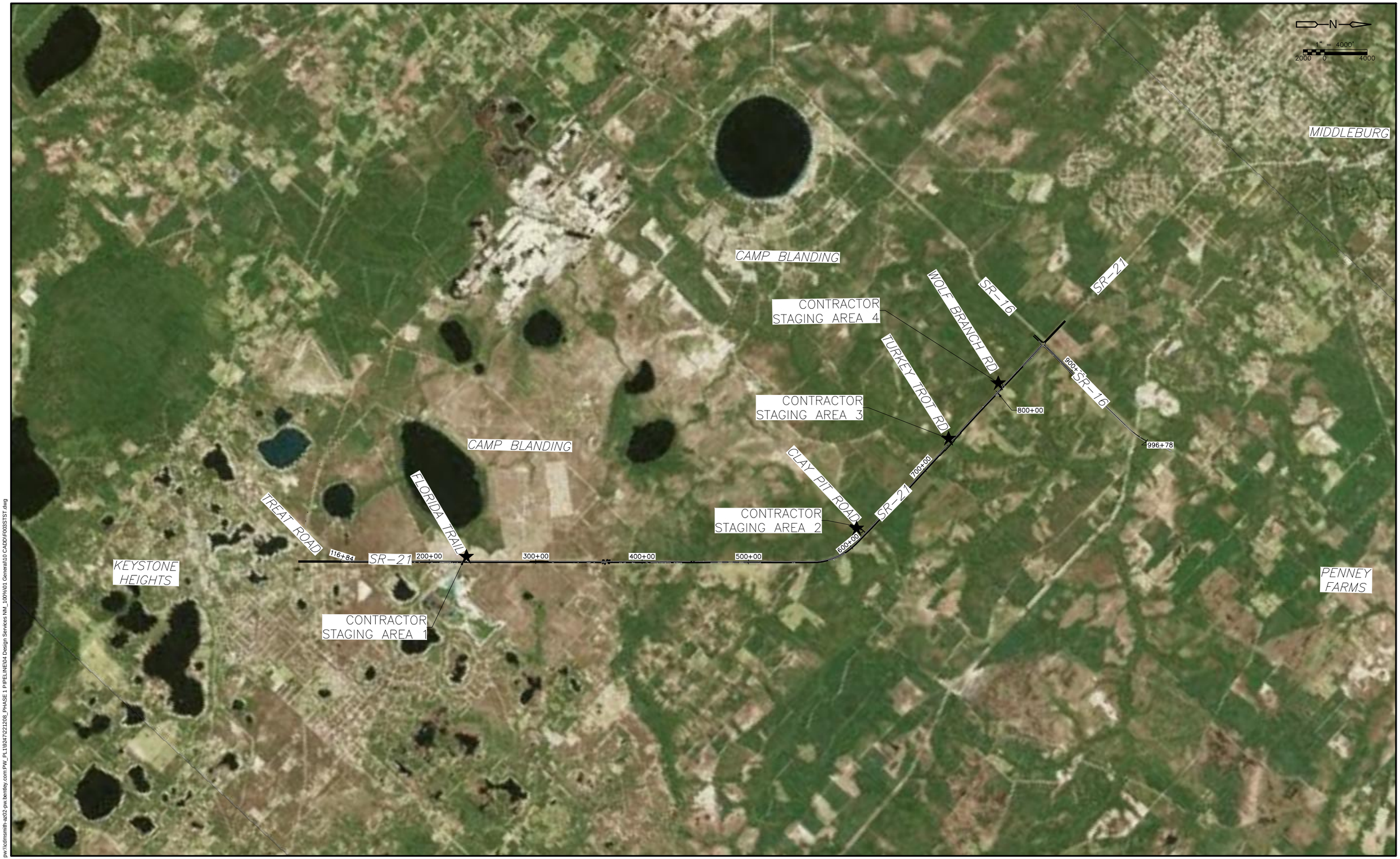
17. FGT's consent is and shall be limited to the encroachment as described and limited by a written Encroachment Agreement that has been entered into between FGT and District.

I. If Contractor is required to coordinate his/her activities in the interface or common areas with other contractors and the utilities, Contractor must submit to the Engineer a description and schedule as to how the common areas will be utilized, recognizing the required coordination with other contractors and the facility operators.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION



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CDM Smith

Figure No. 0
OVERALL CONTRACTOR STAGING AREA
APRIL 2022

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CDM Smith

Figure No. 1
CONTRACTOR STAGING AREA OFF FLORIDA TRAIL
APRIL 2022

CDM Smith

Figure No. 2
CONTRACTOR STAGING AREA CLAY PIT ROAD
APRIL 2022

N

1" = 50'

25 0 50

CONTRACTOR STAGING AREA 3
~ 1.24 ACRES

310'

TURKEY TROT RD

NEW SECURITY FENCE TO MATCH
EXISTING FENCE ALONG SR-21

TEMPORARILY RELOCATED
ACCESS GATE

CAMP BLANDING

420'

382'

SECURITY GATE

CAMP BLANDING

STOP SIGN
RIGHT TURN ONLY

NEW SECURITY FENCE TO MATCH
EXISTING FENCE ALONG SR-21

PROVIDE FPL ACCESS GATE
TYP BOTH SIDES

EXISTING FENCE

NEW SECURITY FENCE TO MATCH
EXISTING FENCE ALONG SR-21

CONNECT TO EXISTING
PERIMETER FENCE
TYP BOTH SIDES

SR-21

EXISTING ACCESS GATE AND FENCING
TO BE TEMPORARILY RELOCATED

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CDM Smith

Figure No. 3
CONTRACTOR STAGING AREA OFF TURKEY TROT ROAD
APRIL 2022

N

1" = 50'

25 0 50

WOLF BRANCH RD

237.3'

NEW SECURITY FENCE TO MATCH
EXISTING FENCE ALONG SR-21

TEMPORARILY RELOCATED
ACCESS GATE

HDD EQUIPMENT
STAGING AREA

CAMP BLANDING

CONTRACTOR STAGING AREA 4
~ 2.2 ACRES

CAMP BLANDING

STOP SIGN
LEFT TURN ONLY

350.0'

SECURITY GATE

NEW SECURITY FENCE TO MATCH
EXISTING FENCE ALONG SR-21

PROVIDE FPL ACCESS GATE
TYP BOTH SIDES

325.0'

EXISTING FENCE

CONNECT TO EXISTING
PERIMETER FENCE
TYP BOTH SIDES

NEW SECURITY FENCE TO MATCH
EXISTING FENCE ALONG SR-21

SR-21

EXISTING POWER POLE
TO BE PROTECTED

PROTECT EXISTING OVERHEAD
CLAY COUNTY POWER LINES

EXISTING ACCESS GATE TO BE
TEMPORARILY RELOCATED

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CDM Smith

Figure No. 4
CONTRACTOR STAGING AREA OFF WOLF BRANCH ROAD
APRIL 2022

SECTION 01050
FIELD ENGINEERING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Provide and pay for field engineering services required for project.

1. Survey work required in execution of project.

2. Civil, structural or other professional engineering services specified, or required to execute Contractor's construction methods.

B. Retain the services of a professional land surveyor and mapper currently licensed in the State of Florida and in good standing with the State of Florida to:

1. Identify existing control points and property line corner stakes indicated on the Drawings, as required.

2. Verify all existing above ground utility and equipment locations.

3. Maintain an accurate location of all buried piping 4-in in diameter and larger.

4. Maintain all survey control for line and grade.

1.02 RELATED WORK

A. Summary of Work is included in Section 01010

B. Applications for Payment are included in Section 01152.

C. Project Record Documents are included in Section 01720.

1.03 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, name and address of professional land surveyor and mapper or professional engineer.

B. On request of the Engineer, submit documentation to verify accuracy of field engineering work. As a minimum the Engineer will review the as-builts on a monthly basis.

C. Submit certificate signed by professional engineer or surveyor and mapper certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

D. At Contract Substantial Completion, submit two sets of certified drawings with the Surveyors title block (signed and sealed by the professional surveyor and mapper) of the items listed below. All surveys shall be tied to State Plane Coordinate System. Vertical control shall be based on NAVD 1988. These drawings shall be included with, and made a part of, the project record documents.

1. Certified structure and pipeline survey indicating the structure corners and elevations, and pipeline locations and crown elevations at 100-foot intervals and at all changes in alignment.

2. Certified survey shall be at the same scale as the Engineer's drawings (C Sheets).

3. Contractor shall also submit record drawing files in AutoCAD Civil 3D (2017 or earlier) format on CDs. All entries shall be placed on layers named to describe the entity being mapped. All elevation information in the AutoCAD file shall be in an appropriate three-dimensional format.

1.04 QUALIFICATIONS OF SURVEYOR OR ENGINEER

A. Registered professional engineer or surveyor and mapper of the discipline required for the specific service on the project, currently licensed in the State of Florida.

1.05 SURVEY REFERENCE POINTS

A. Existing basic horizontal and vertical control points for the project are those designated on Drawings.

B. Locate and protect control points prior to starting site work and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to the Engineer.

2. Report to the Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

3. Require surveyor to correctly replace project control points which may be lost or destroyed.
   a. Establish replacements based on original survey control.
   b. Reset control points relocated due to project routing.

1.06 PROJECT SURVEY REQUIREMENTS

A. Establish a minimum of two permanent bench marks on site, referenced to data established by survey control points.

1. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate and lay out, by instrumentation and similar appropriate means:

1. Site improvements
   a. Stakes for grading, fill and topsoil placement.
   b. Utility slopes and invert elevations.

C. Verify layouts by same methods monthly and submit to the Engineer.

1.07 RECORDS

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

B. Update the project record drawings on a monthly basis based on the work performed during the month ending at the pay request as a condition for approval of monthly progress payment requests.

C. Maintain an accurate record of all changes, revisions, and modifications.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01065
PERMITS AND FEES

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. The Contractor shall obtain and pay for any and all permits and licenses required to complete the project except for those permits obtained by District as listed below or as specified otherwise.

B. Schedule all inspections and obtain all written approvals of the agencies required by the permits and licenses.

C. Comply with all construction related conditions specified in each of the permits and licenses.

1.02 PERMITS BY DISTRICT

A. The District has obtained or will obtain the permits listed below, see Section 01002 for a copy of the permits:

1. The Florida Department of Environmental Protection (FDEP) Environmental Resource Permit (ERP)

2. FDEP Consumptive Use Permit (CUP) for withdrawals from Black Creek

3. U.S. Army Corps of Engineers (ACOE) Section 404 (Clean Water Act) Individual Permit

4. Florida Department of Transportation (FDOT) Right-of-Way Utility Permit

1.03 PERMIT REQUIREMENTS

A. A gopher tortoise survey of the project area is required. Should gopher tortoise relocation be required, the Contractor shall obtain a Florida Fish and Wildlife Conservation Commission (FWC) Temporary Exclusion Permit for Major Linear Utility Corridors permit for on-site gopher tortoise relocation.

B. Contractor shall be responsible for preparation of a Stormwater Pollution Prevention Plan and shall obtain an FDEP permit for stormwater discharge from construction activities.

C. The Contractor shall be responsible for development of an eastern indigo snake protection/education plan as required by the ACOE. The plan shall be provided to the ACOE for review and approval at least 30 days prior to any clearing activities.

D. Contractor shall be responsible for obtaining FDEP Consumptive Use Permit (CUP) for withdrawals needed to secure a water source during construction activities.

E. If dewatering discharges to waters of the State are proposed, the Contractor may be required to obtain an FDEP Generic Permit for the Discharge of Produced Groundwater from any Non-Contaminated Site Activity.

F. The Contractor shall be responsible for obtaining any required tree removal permits.

G. Contractor shall be responsible for providing a Maintenance of Traffic (MOT) Plan which compiles to FDOT standards.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01095
REFERENCES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Reference Abbreviations

B. Abbreviations

C. Reference Standards

D. Definitions

1.02 RELATED SECTIONS

A. Information provided in this section is used where applicable in individual Specification Sections, Divisions 2 through 16.

1.03 REFERENCE ABBREVIATIONS

A. Reference to a technical society, trade association or standards setting organization, may be made in the Specifications by abbreviations in accordance with the following list:

AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ADC	Air Diffusion Council
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	Association of Home Appliance Manufacturers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	American Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders' Hardware Manufacturers Association

BIA	Brick Institute of American
CABO	Council of American Building Officials
CAGI	Compressed Air and Gas Institute
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRD	U.S. Corps of Engineers Specifications
CRSI	Concrete Reinforcing Steel Institute
CTI	Cooling Tower Institute
DHI	Door and Hardware Institute
DOH	Department of Health
DOT	Department of Transportation
Fed. Spec.	Federal Specifications
FGMA	Flat Glass Marketing Association
FM	Factory Mutual
HMI	Hoist Manufacturing Institute
HPMA	See HPVA
HPVA	Hardwood Plywood Veneer Association
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IFI	Industrial Fasteners Institute
MIL	Military Specifications
MSS	Manufacturer's Standardization Society
NAAMM	National Association of Architectural Metal Manufacturers
NACM	National Association of Chain Manufacturers
NBS	National Bureau of Standards, See NIST
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NETA	National Electrical Testing Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NFPA	National Fluid Power Association
NIST	National Institute of Standards and Technology
NLMA	National Lumber Manufacturers Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Act
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPI	Society of the Plastics Industry
SSPC	Steel Structures Painting Council
STI	Steel Tank Institute
TCA	Tile Council of American
TIMA	Thermal Insulation Manufacturers' Association
UL	Underwriters' Laboratories, Inc.
USBR	U. S. Bureau of Reclamation
USBS	U. S. Bureau of Standards, See NIST

1.04 ABBREVIATIONS

A. Abbreviations which may be used in individual Specification Sections Divisions 1 through 16 are as follows:

alternating current ..... ac
American wire gauge ..... AWG
ampere(s)..... amp
ampere-hour(s)..... AH
annual..... ann
Ampere Interrupting Capacity ..... AIC
atmosphere(s)..... atm
average ..... avg

biochemical oxygen demand.....BOD
Board Foot ..... FBM
brake horsepower ..... bhp
Brinell Hardness..... BH
British thermal unit(s) ..... Btu

calorie (s) ..... cal
carbonaceous biochemical oxygen demand ..... CBOD
Celsius (centigrade) C
Center to Center ..... C to C
centimeter(s) ..... cm
chemical oxygen demand.....COD
coefficient, valve flow ..... C_v
condensate return .....CR
cubic..... cu
cubic centimeter(s)..... cc
cubic feet per day .....cfd
cubic feet per hour .....cfh
cubic feet per minute.....cfm
cubic feet per minute, standard conditions ..... scfm
cubic feet per second..... cfs
cubic foot (feet).....cu ft
cubic inch(es) ..... cu in
cubic yard(s)..... cu yd

decibels ..... dB
decibels (A scale).....dBa
degree(s)..... deg
dewpoint temperature.....dpt
diameter .....dia
direct current ..... dc
dissolved oxygen..... DO
dissolved solids .....DS
dry-bulb temperature ..... dbt

efficiency .....eff
elevation..... el
engineer of record..... EOR
entering water temperature .....ewt
entering air temperature.....eat
equivalent direct radiation ..... edr

face area..... fa
face to face.....f to f
Fahrenheit ..... F
feet per day .....fpd
feet per hour.....fph
feet per minute .....fpm
feet per second..... fps
foot (feet) .....ft
foot-candle ..... fc
foot-pound ..... ft-lb
foot-pounds per minute..... ft-lb/min
foot-pounds per second..... ft-lb/sec
formazin turbidity unit(s).....FTU
frequency .....freq
fuel oil..... FO
fuel oil supply .....FOS
fuel oil return .....FOR

gallon(s)..... gal
gallons per day..... gpd
gallons per day per cubic foot .....gpd/cu ft
gallons per day per square foot ..... gpd/sq ft
gallons per hour ..... gph
gallons per minute ..... gpm
gallons per second .....gps
gas chromatography and mass spectrometry .....GC-MS
gauge..... ga
grain(s).....gr
gram(s)..... g
grams per cubic centimeter.....gm/cc
Heat Transfer Coefficient ..... U
height ..... hgt
Hertz ..... Hz

horsepower ..... hp
horsepower-hour ..... hp-hr
hour(s) ..... hr
humidity, relative ..... rh
hydrogen ion concentration ..... pH

inch(es) ..... in
inches per second ..... ips
inside diameter ..... ID

Jackson turbidity unit(s) ..... JTU

kelvin ..... K
kiloamperes ..... kA
kilogram(s) ..... kg
kilometer(s) ..... km
kilovar (kilovolt-amperes reactive) ..... kvar
kilovolt(s) ..... kV
kilovolt-ampere(s) ..... kVA
kilowatt(s) ..... kW
kilowatt-hour(s) ..... kWh

linear foot (feet) ..... lin ft
liter(s) L

megavolt-ampere(s) ..... MVA
meter(s) ..... m
micrograms per liter ..... ug/L
miles per hour ..... mph
milliampere(s) ..... mA
milligram(s) ..... mg
milligrams per liter ..... mg/L
milliliter(s) ..... mL
millimeter(s) ..... mm
million gallons ..... MG
million gallons per day ..... mgd
millisecond(s) ..... ms
millivolt(s) ..... mV
minute(s) ..... min
mixed liquor suspended solids ..... MLSS
nephelometric turbidity unit ..... NTU
net positive suction head ..... NPSH
noise criteria ..... nc
noise reduction coefficient ..... NRC
number ..... no

ounce(s) ..... oz
outside air ..... oa
outside diameter ..... OD

parts per billion ..... ppb
parts per million ..... ppm
percent ..... pct
phase (electrical) ..... ph
pound(s) ..... lb
pounds per cubic foot ..... pcf
pounds per cubic foot per hour ..... pcf/hr
pounds per day ..... lbs/day
pounds per day per cubic foot ..... lbs/day/cu ft
pounds per day per square foot ..... lbs/day/sq ft
pounds per square foot ..... psf
pounds per square foot per hour ..... psf/hr
pounds per square inch ..... psi

pounds per square inch absolute ..... psia
pounds per square inch gauge ..... psig
power factor ..... PF
pressure drop or difference ..... dp
pressure, dynamic (velocity) ..... vp
pressure, vapor ..... vap pr

quart(s) ..... qt

Rankine ..... R
relative humidity ..... rh
resistance ..... res
return air ..... ra
revolution(s) ..... rev
revolutions per minute ..... rpm
revolutions per second ..... rps
Right of Way ..... ROW
root mean squared ..... rms

safety factor ..... sf
second(s) ..... sec
shading coefficient ..... SC
sludge density index ..... SDI

Sound Transmission Coefficient ..... STC
specific gravity ..... sp gr

specific volume ..... Sp Vol
sp ht at constant pressure ..... Cp
square ..... sq
square centimeter(s) ..... sq cm
square foot (feet) ..... sq ft
square inch (es) ..... sq in
square meter(s) ..... sq m
square yard(s) ..... sq yd
standard ..... std
static pressure ..... st pr
supply air .... sa
suspended solids ..... SS

temperature ..... temp
temperature difference ..... TD
temperature entering ..... TE
temperature leaving ..... TL
thousand Btu per hour ..... Mbh
thousand circular mils ..... kcmil
thousand cubic feet ..... Mcf
threshold limit value ..... TLV
tons of refrigeration ..... tons
torque ..... TRQ
total dissolved solids ..... TDS
total dynamic head ..... TDH
total kjeldahl nitrogen ..... TKN
total oxygen demand ..... TOD
total pressure ..... TP
total solids ..... TS
total suspended solids ..... TSS
total volatile solids ..... TVS
vacuum ..... vac
viscosity ..... visc
volatile organic chemical ..... VOC
volatile solids ..... VS
volatile suspended solids ..... VSS
volt(s) V
volts-ampere(s) ..... VA
volume ..... vol
watt(s) ..... W
watthour(s) ..... Wh
watt-hour demand ..... WHD
watt-hour demand meter ..... WHDM
week(s) ..... wk
weight ..... wt
wet-bulb ..... WB
wet bulb temperature ..... WBT

yard(s) ..... yd
year(s) ..... yr

1.05 REFERENCE PUBLICATIONS

A. The following publications are incorporated into this manual and are made a part of this Manual as is set out verbatim in this Manual. Violations of any provision of every such publication, latest revision, shall be a violation of City Ordinance.

1. Water Environment Federation, Manual of Practice No. 8, Wastewater Treatment Plant Design, W.E.F., 601 Wythe Street, Alexandria, VA, 22314-1994.

2. Water Environment Federation, Manual of Practice No. 9, Design and Construction of Sanitary and Storm Sewers, W.E.F., 601 Wythe Street, Alexandria, VA, 22314-1994.

3. Great Lakes/Upper Mississippi River Board of State Sanitary Engineers. Recommended Standards for Sewage Works, Health Education Service, Inc., P.O. Box 7283, Albany, New York, 12224.

4. Great Lakes/Upper Mississippi River Board of State Sanitary Engineers. Recommended Standards for Water Works, Health Education Service, Inc., P.O. Box 7283, Albany, New York, 12224.

5. Florida Department of Environmental Protection for Water, Wastewater, and Reclaimed Water Systems, latest revisions of F.A.C. Chapters 62-550, 62-555, 62-600, 62-604, 62-610, 64E-6, and 64E-8, 3900 Commonwealth Boulevard M.S. 49, Tallahassee, Florida, 32399.

6. American Water Works Association, Inc., Water Treatment Plant Design, 6666 West Quincy Avenue, Denver, Colorado, 80235.

7. American Water Works Association, Inc., Water Treatment Plant Design, AWWA Standards and Applicable Manuals, 6666 West Quincy Avenue, Denver, Colorado, 80235.

8. Ductile Iron Pipe Research Association, Handbook, Ductile Iron Pipe/Cast Iron Pipe, Ductile Iron Pipe Research Association, 245 Riverchase Parkway East, Birmingham, Alabama, 35244.

9. Uni-Bell Plastic Pipe Association, Handbook of PVC Pipe, Uni-Bell Plastic Pipe Association, 2655 Villa Creek Drive, Suite 164, Dallas, Texas, 75234.

10. American National Standards Institute, latest revisions of applicable standards, 1819 L Street NW, Suite 600, Washington, D.C., 20036.

11. American Society for Testing and Materials, latest revisions of applicable standards, ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, Pennsylvania, 19428-2959.

12. National Water Research Institute, Treatment Technologies for Removal of MTBE. NWRI, 10500 Ellis Ave., P.O. Box 20865, Fountain Valley, CA, 92728.

13. National Water Research Institute, Valuing Ground Water: Economic Concepts/Approaches. NWRI, 10500 Ellis Ave., P.O. Box 20865, Fountain Valley, CA, 92728.7.3.14.

14. U.S. Environmental Protection Agency, Design Criteria for Mechanical, Electric, and Fluid System and Component Reliability, Supplement to the Federal Guidelines for Design, Operation, and Maintenance of Wastewater Treatment Facilities, Technical Bulletin EPA-430-99-74-001, U.S. EPA, Office of Water Program Operations.

15. Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, Maps & Publications Sales, Mail Station 12, 605 Suwannee Street, Tallahassee, Florida 32399-0450.

16. Plastics Pipe Institute, Handbook of Polyethylene Pipe, 1825 Connecticut Ave., NW, Suite 680, Washington, DC 20009.

17. National Fire Protection Association, 1995 Edition of NFPA 24 – Standard for the Installation of Private Fire Service Mains and Their Appurtenances, 1 Batterymarch Park, Quincy, MA 02169.

18. National Electrical Code, latest revisions of applicable requirements.

19. Metcalf and Eddy, Wastewater Engineering Treatment and Reuse, 4th Edition, McGraw-Hill, 2002.

20. Water Environment Federation, Manual of Practice No. 11, Operation of Municipal Wastewater Treatment Plants, 601 Wythe Street, Alexandria, VA 22314-1994.

21. American Petroleum Institute, 1801 K Street NW, Washington, DC 20006.

22. American Welding Society, 2501 NW 7th St, Miami, FL 33125.

23. Factory Mutual Research, 1151 Boston-Providence Turnpike, Norwood, MA 02062

24. National Association of Corrosion Engineers, P.O. Box 218340, Houston, TX 77218.

25. National Electrical Manufacturer's Association, 155 East 44th St., NY, NY 10017.

26. Occupational Safety and Health Act, U.S. Dept. of Labor, Occupational Safety and Health Administration, 299E. Broward Blvd. – Rm 302, Ft. Lauderdale, FL 33301.

27. Society of Automotive Engineers, 2 Pennsylvania Plaza, NY, NY 10001.

28. Steel Structures Painting Council, 4400 Fifth Ave., Pittsburgh, PA 15213.

29. Standard Specification for Public Works, Construction Building News, Inc., 3055 Overland Ave., Los Angeles, CA 90034.

30. Uniform Building Code, published by ICBO.

31. Underwriters Laboratories, Inc., 207 East Ohio Street, Chicago, IL 60611.

1.06 REFERENCE STANDARDS

A. Latest Edition: Construe references to furnishing materials or testing, which conform to the standards of a particular technical society, organization, or body, to mean the latest standard, code, or specification of that body, adopted and published as of the date of bidding this Contract. Standards referred to herein are made a part of these Specifications to the extent that is indicated or intended.

B. Precedence: The duties and responsibilities of the District, Contractor or Engineer, or any of their consultants, agents or employees are set forth in the Contract Documents, and are not changed or altered by any provision of any referenced standard specifications, manuals or code, whether such standard manual or code is or is not specifically incorporated by reference in the Contract Documents. Any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority, to undertake responsibility contrary to the powers of the Engineer as set forth in the Contract Documents cannot be assigned to the Engineer or any of the Engineer's consultants, agents or employees.

1.07 DEFINITIONS

A. In these Contract Documents the words furnish, install, and provide are defined as follows:

1. Furnish (Materials): to supply and deliver to the project ready for installation and in operable condition.

2. Install (services or labor): to place in final position, complete, anchored, connected in operable condition.

3. Provide: to furnish and install complete. Includes the supply of specified services. When neither furnish, install, or provide is stated, provided is implied.

4. District: St Johns River Water Management District, Florida, or authorized staff or representatives.

5. Engineer: The terms Design Professional, Design Engineer, Engineer, and Engineer of Record are interchangeably used throughout the Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01100
SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.01 WORKMANSHIP, MATERIAL AND EQUIPMENT

A. When a particular product is specified or called for, it is intended and will be understood that the proposal tendered by the Contractor included those products in his bid. Should the Contractor desire to submit products considered equal to those specified, the Contractor will furnish information as described in the General Conditions and Section 01300. The alternate product or products submitted by the Contractor will meet the requirements of the specifications and will, in all respects, be equal to the products specified by name herein. All alternate equipment must be approved by the Engineer.

B. All apparatus, mechanism, equipment, machinery and manufactured articles for incorporation into the Work will be the new and unused standard products of recognized reputable manufacturers.

C. Contractor must provide for disposal of excess excavated material.

1.02 CONNECTIONS TO EXISTING SYSTEMS

A. The Contractor will perform all work necessary to locate, excavate and prepare for connections to the terminus of the existing systems all as shown on the Drawings. The cost for this work and for the actual connection to the existing systems will be included in the bid price for the project and will not result in any additional cost to the District.

1.03 OPERATING AND MAINTENANCE DATA

A. Operating and maintenance data covering all equipment furnished will be delivered directly to the Engineer for approval within 60 days of shop drawing approval of each piece of equipment. No payment will be made for equipment installed or stored on-site until the Engineer has approved the adequacy and completeness of the operating and maintenance data. Data will be prepared and submitted in full conformance with Section 01730. Final approved copies of operating and maintenance data will have been delivered to the Engineer on District's behalf two weeks prior to scheduling the instruction period with the District.

1.04 RESPONSIBILITY OF CONTRACTOR

A. The Contractor will be responsible for the entire Work determined by the Drawings, Specifications and Contract from the date of the starting of the Work until it is accepted as evidence of approval of the Completion Certificate by the District. He will be responsible for removals, renewals and replacements due to action of the elements and all other causes except as otherwise provided in the Specifications. The Contractor will keep the Contract under his own control and it will be his responsibility to see that the Work is properly supervised and carried on faithfully and efficiently. The Contractor will supervise the work personally or will have a competent, English speaking superintendent or representative, who will be on the site of the project at all working hours, and who will be clothed with full authority by the Contractor to direct the performance of the work and make arrangement for all necessary materials, equipment and labor without delay.

B. Renewals or repairs necessitated because of defective materials or workmanship, or due to action of the elements or other natural causes, including fire and flood, prior to the acceptance as determined by the Completion Certificate, will be done anew in accordance with the Contract and Specifications at the expense of the Contractor.

1.05 PROVISIONS FOR CONTROL OF EROSION

A. Sufficient precautions will be taken during construction to minimize the run-off of polluting substances such as silt, clay, fuels, oils, bitumens, calcium chloride, or other polluting materials harmful to humans, fish, or other life, into the supplies and surface waters of the state. Control measures must be adequate to assure that turbidity in the receiving water will not be increased more than 10 nephelometric turbidity units (NTU), or as otherwise required by the state or other controlling body, in water used for public water supply or fish unless limits have been established for the particular water. In surface water used for other purposes, the turbidity must not exceed 25 NTU unless otherwise permitted. Special precautions will be taken in the use of construction equipment to prevent operations which promote erosion.

Erosion evident within the limits of construction will be the responsibility of the Contractor during the full term of the contract and for the full (1) year guarantee period. Areas subject to erosion during this time will be fully restored to original or design conditions (as applicable) within 10 days of notice to the Contractor.

1.06 ON SITE STORAGE

A. The Contractor's attention is invited to special storage requirements and possible charges for noncompliance of on-site storage requirements for materials and equipment as specified in Section 01600.

1.07 WARRANTIES

A. Unless specified otherwise in the Contract Documents, all equipment supplied under these Specifications will be warranted by the Contractor and the equipment manufacturers for a period of one (1) year. Warranty period will commence on the date of Final Acceptance by the District.

B. The equipment will be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it will be replaced at no expense to the District.

C. The manufacturer’s warranty period will run concurrently with the Contractor's warranty or guarantee period. No exception to this provision will be allowed. The Contractor will be responsible for obtaining equipment warranties in accordance with Section 01740 from each of the respective supplier or manufacturers for all the equipment specified. The form of warranty is included in the front-end documents.

1.08 UTILITY CROSSINGS

A. It is intended that wherever existing utilities such as water, chemical, electrical or other service lines must be crossed, deflection of the pressure pipe within recommended limits and cover will be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings.

However, when in the opinion of the District or Engineer this procedure is not feasible he/she may approve the use of fittings for a utility crossing as detailed on the Drawings.

1.09 CONSTRUCTION CONDITIONS AND SUBSURFACE INVESTIGATION

A. The Contractor will strictly adhere to the specific requirements of the governmental unit(s) or agency(ies) having jurisdiction over the work. Wherever there is a difference in the requirements of a jurisdictional body and these Specifications, the more stringent will apply.

B. The Contractor will be responsible for having determined to his satisfaction, prior to the submission of his bid, the nature and location of the work, the conformation of the ground, the character and quality of the substrata, the types and quantity of materials to be encountered, the nature of the groundwater conditions, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work under this contract. The prices established for the work to be done will reflect all costs pertaining to the work. Any claims for extras based on substrata, groundwater table, and other such conditions will not be allowed.

1.10 PUBLIC NUISANCE

A. The Contractor will not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, excessive noise, or odor.

B. The Contractor shall maintain the sound levels in accordance with the conditions listed here and in Section 01001.

C. Sound levels measured by the District will not exceed 55 dBA from 8:00 PM to 8:00 AM or 65 dBA from 8:00 AM to 8:00 PM. This sound level to be measured at the Owner's property line. Levels at the equipment will not exceed 95 dBA at the equipment at any time. Sound levels in excess of these values are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the District due to excessive noise will not relieve the Contractor of the other portions of this specification including, but not limited to contract time and contract price.

D. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.11 SUSPENSION OF WORK DUE TO WEATHER

A. During inclement weather, all work which might be damaged or rendered inferior by such weather conditions will be suspended. During suspension of the work from any cause, the work will be suitably covered and protected so as to preserve it from injury by the weather. Refer to General Conditions for additional requirements.

1.12 RELOCATIONS

A. The Contractor will be responsible for the relocation of structures, including but not limited to light poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. The cost of all such relocations will be included in the bid. Any relocation of the above items will require written approval by the Engineer prior to relocation.

1.13 PUMPING

A. The Contractor with his own equipment will do all pumping necessary to prevent flotation of any part of the structures during construction operations.

B. The Contractor will, for the duration of the contract and with his own equipment, pump out water which may seep or leak into the excavations or structures. Galleries and other operating areas will be kept dry at all times. The extent of pumping required in the tanks, channels and other non-operating areas will be determined by the Engineer. Discharges will be in conformance with applicable regulations and permits.

1.14 DISTRICT OCCUPANCY AND OPERATION OF COMPLETED FACILITIES

A. The District will not accept portions of the work completed prior to completion of the entire work. This entire project will be tested and completed as a whole.

1.15 EASEMENT FOR WORK ON PRIVATE PROPERTY

A. The Contractor will maintain his construction operations within the presently existing road right-of-way and any easement/agreements obtained by the District (see Section 01002) throughout the project. The Contractor shall satisfy all of the easement/agreement requirements.

B. In the event that the Contractor deems it necessary or advisable to operate beyond the limits of the existing right-of-way and established easements, he will be responsible for making special agreements with the property owners. Immediately after an award of contract is made, the Contractor will submit to the District a listing of those areas in which he deems it to be necessary to work outside of the project limits. The listing will be subject to the approval of the District and as construction areas are secured, copies of all written agreements will be placed on file with the District and Engineer.

C. The Contractor will be responsible for any encroachments on rights-of-way or property of the public or adjoining property owners and will hold the District, Engineer and Consultant(s), Camp Blanding, Clay County, CCUA, Semark Ranch, and FDOT harmless because of any encroachments which may be a result of his lack of proper layout. In this regard, he will, without extra cost to the District, move any work or that portion of any work that encroaches on the property of others, or that is built beyond legal building or setback limits, and he will rebuild the affected work or portion of work at the proper location and in full compliance with the Contract Documents.

D. Before final payment will be authorized, the Contractor will be required to furnish the District with written releases from property owners or public agencies where side agreements or special easements have been made by the Contractor or when the Contractor's operations, for any reason, have not been kept within the construction easements by the District.

E. In the event the Contractor is unable to secure the written releases required in the above paragraph, he will inform the District of the reasons for his failure to do so. The District or its representatives will then examine the site and the District will direct the Contractor to complete any work that may be necessary to satisfy the terms of the permit or easement. Should the Contractor refuse to do the work, the District reserves the right to have it done by separate contract and deduct the cost of same from moneys due the Contractor, or he may require the Contractor to furnish a bond in a sum satisfactory to the District to cover any legal claims for

damages. When the District is satisfied that the work has been completed in agreement with the Contract Documents and the terms of the permit or easement, he reserves the right to waive the requirement of obtaining the statement if the Contractor's failure to obtain such statement is due to the grantor's refusal to sign and this refusal is not based upon any legitimate claims that the Contractor has failed to fulfill the terms of the license or easement, or if the Contractor is unable to contact or has undue hardship in contacting the grantors.

1.16 EXAMINATION OF PRIVATE PROPERTY PRIOR TO CONSTRUCTION

A. If the Contractor desires to enter private property to determine their condition prior to construction, the Contractor will first obtain a letter of permission and introduction from the District.

1.17 CLEAN-UP AND DUST CONTROL

A. At all times during the prosecution of the work, the Contractor will maintain sufficient forces to clean up and control dust.

1.18 DAILY REPORTS

A. The Contractor will submit daily reports of construction activities, including non-work days. A sample report will be submitted to the Engineer for approval. The report will include:

1. Manpower, number of men by craft;

2. Equipment on the project;

3. Major deliveries;

4. Activities work with reference to the CPM schedule activity numbers;

5. New problems; and

6. Other pertinent information

B. A similar report will be submitted for/by each Subcontractor.

C. The reports will be submitted to the Engineer's Office within two days of the respective report date. Each report will be signed by the Contractor's Superintendent or Project Manager.

D. Information provided on the daily report will not constitute notice of delay or any other notice required by the Contract Documents. Notice will be as required therein.

1.19 COORDINATION OF WORK

A. Other construction may occur in the vicinity of this project during the course of the Contract. In such instances, the Contractor will be required to cooperate fully so as to eliminate or minimize the creation of conflicts. Adjustments from time to time may be required in the Contractor's work location and/or schedule provided a reasonable notice is given by the District or Engineer.

B. The Contractor will afford other contractors and the District reasonable opportunity for the introduction and storage of their materials and equipment and the execution of their work and

will properly connect and coordinate the Work with such other work. The Contractor will coordinate his Work with the District and other contractors to store his apparatus, materials, supplies and equipment in such orderly fashion at the site of the Work as will not unduly interfere with the progress of the Work or the work of any other contractors.

C. If the execution or result of any part of the Work depends upon any work of the District or of any separate contractor, the Contractor will, prior to proceeding with the Work, inspect and promptly report to the District in writing any apparent discrepancies or defects in such work of the District or of any separate contractor that render it unsuitable for the proper execution or result of any part of the Work.

D. Failure of the Contractor to so inspect and report will constitute an acceptance of the District's or separate contractor's work as fit and proper to receive the Work, except as to defects which may develop in the District's or separate contractor's work after completion of the Work and which the Contractor could not have discovered by its inspection prior to completion of the work.

E. Should the Contractor cause damage to the work or property of the District or of any separate contractor on the Project, or to other work on the Site, or delay or interfere with the District's work on ongoing operations or facilities or adjacent facilities or said separate contractor's work, the Contractor will be liable for the same; and, in the case of another contractor, the Contractor will attempt to settle said claim with such other contractor prior to such other contractor's institution of litigation or other proceedings against the Contractor.

F. If such separate contractor sues the District on account of any damage, delay or interference caused or alleged to have been so caused by the Contractor, the District will notify the Contractor, who will defend the District in such proceedings at the Contractor's expense. If any judgment or award is entered against the District, the Contractor will satisfy the same and will reimburse the District for all damages, expenses, attorney's fees and other costs which the District incurs as a result thereof.

G. Should a separate contractor cause damage to the Work or to the property of the Contractor or cause delay or interference with the Contractor's performance of the Work, the Contractor will present directly to said separate contractor any claims it may have as a result of such damage, delay or interference (with an information copy to the District) and will attempt to settle its claim against said separate contractor prior to the institution of litigation or other proceedings against said separate contractor.

H. In no event will the Contractor seek to recover from the District or the Engineer, and the Contractor hereby represents to the District and the Engineer that it will not seek to recover from them, or either of them, any costs, expenses, (including, but not limited to, attorney's fees) or losses of profit incurred by the Contractor as a result of any damage to the Work or property of the Contractor or any delay or interference caused or allegedly caused by any separate contractor.

I. Any difference or conflict which may arise between the Contractor and other contractors who may be performing work in behalf of the District, or between the Contractor and workmen of the District in regard to their work will be adjusted and determined by the Engineer. If the work of the Contractor is delayed because of any acts of omissions of any other contractor of the District, the Contractor will on that account have no claim against the District other than for an extension of time.

1.20 FINAL GUARANTEE

A. All work will be guaranteed by the Contractor for a period of one year from and after the date of Initiation of Operation by the District.

B. If, within the guarantee period, repairs or changes are required in connection with guaranteed work, which, in the opinion of the District, is rendered necessary as the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the Contract, the Contractor will, promptly upon receipt of notice from the District and without expense to the District, do the following:

1. Place in satisfactory condition in every particular all of such guaranteed work and correct all defects therein.

2. Make good all damage to the building or site, or equipment or piping or contents thereof, which, in the opinion of the District, is the result of the use of materials, equipment or workmanship which are inferior, defective, or not in accordance with the terms of the contract.

3. Make good any work or material, or the equipment and contents of building, structure or site disturbed in fulfilling any such guarantee.

4. Restart the warranty period as follows: Where defective Work (and damage to other Work resulting therefrom) has been corrected, removed, or replaced under this paragraph, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

C. If the Contractor, after notice, fails within 10 days to proceed to comply with the terms of this guarantee, the District may have the defects corrected, and the Contractor and his surety will be liable for all expense incurred, provided, however, that in case of an emergency where, in the opinion of the District, delay would cause loss or damage, repairs may be started without notice being given to the Contractor and the Contractor will pay the cost thereof.

D. All special guarantees or warranties applicable to specific parts of the work as may be stipulated in the Contract Specifications or other papers forming a part of this Contract will be subject to the terms of this paragraph during the first year of life of each such guarantee. All special guarantees and manufacturers' warranties will be assembled by the Contractor and delivered to the Engineer, along with a summary list thereof, before the acceptance of the work.

1.21 MAINTENANCE SCHEDULES

A. The Contractor's attention is directed to Section 01730 for requirements relative to the submission of operating and maintenance data for the mechanical equipment. For all mechanical equipment furnished, the Contractor will provide a list including the equipment name, address, and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.

1.22 INSTALLATION LISTS

A. All manufacturers or equipment suppliers who propose to furnish equipment or products under Division 15 will submit an installation list to the Engineer along with the required Shop Drawings.

B. The installation list will include all installation where identical equipment has been installed and has been in operation for a period of at least one year.

1.23 EMERGENCIES

A. The Contractor will at all times after regular working hours, including weekend and holidays, maintain a telephone where he or his representative can be reached on an emergency basis. The Contractor or his representative will be prepared to act to correct conditions on the site deemed to constitute an emergency by either the District, his agent, the Engineer or local authorities and is obligated to act to prevent threatened damage, injury or loss without special instructions from the District or Engineer. The Contractor will give the Engineer prompt written notice of all significant changes in the work or deviations from the Contract Documents caused thereby. If a condition on the site requires attention after working hours, either the District, agent, Engineer, or local Authority will call the Contractor or his representative at the emergency telephone number, identify himself and describe the emergency condition. The Contractor is expected to dispatch personnel and equipment to adequately institute corrective measures within two hours. If for some reason the Contractor or his agent cannot be reached at the emergency number after a reasonable time (two hours), the District will have the right to immediately initiate corrective measures, and the cost will be borne by the Contractor.

B. In the event that the Contractor fails to maintain safe job conditions and traffic conditions, including, but not limited to, trench settlement and hazardous storage of backfill or construction materials, the District, after failure of the Contractor to commence substantial steps at the job site to rectify the situation within two hours of the time the Contractor has been notified of the unsafe condition, may hire guards, take such precautions, make such repairs and take any other steps which the District or the District's agent in its discretion, considers necessary to protect the property, persons, or the District. The cost of any of these precautions, guards, or steps will be deducted from the payments due the Contractor, and the Contractor will be billed for these services, work and material at prevailing rates.

C. Accidents will be reported immediately to the District and Engineer by messenger or phone.

1.24 CLAIM OR PROPERTY DAMAGES AND CITIZEN'S CONCERNS/INQUIRIES

A. In the event of any indirect or direct damage to public or private property caused in whole or in part by an act, omission or negligence on the part of the Contractor, any Subcontractor, any Sub-subcontractor, or anyone directly or indirectly employed by any of them or by anyone for whose acts any of them may be liable, the Contractor will at his own expense and cost promptly remedy and restore such property to a condition equal to or better than that existing before such damage was done. The Contractor will perform such restoration by under-pinning, repairing, rebuilding, replanting, or otherwise restoring as may be required by the Engineer or District, or will make good such damage in a satisfactory and acceptable manner. In case of failure on the part of the Contractor to promptly restore such property or make good such damage, the District may, upon five calendar days written notice, proceed to repair, rebuild or otherwise restore such property as may be necessary and the cost thereof, or a sum sufficient in the judgement of the District to

reimburse the owners of the property so damaged, will be deducted from any monies due or to become due the Contractor under the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01150
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The scope of this section defines the items included in each bid item in the Bid Proposal for the District's Black Creek Raw Water Transmission Main Project. Payment will be made based on the specified items included in the description in this section for each bid item.

B. All contract prices included in the Submitted Bid section will be full compensation for all labor, materials, tools, equipment and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the specifications. Payment for all items listed in the Submitted Bid will constitute full compensation for all work shown and/or specified to be performed under this project.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 BASE BID

A. Bonds and Insurance (Bid Item 1)

1. Measurement of the lump sum price established in the Submitted Bid will be based on actual invoice amounts to substantiate the actual bond and insurance premiums.

2. Payment of the lump sum price established in the Submitted Bid will be made at the applicable lump sum amount, as above determined, and will represent full compensation for providing the required 100 percent Payment Bond, 100 percent Performance Bond, all insurance and mobilization/ demobilization in accordance with the requirements of the General Conditions.

B. Mobilization and Demobilization (Bid Item 2)

1. Measurement
   a. Measurement of the lump sum price established in the Submitted Bid will be based on the payment schedule in Paragraph 2 for the mobilization, including, but not limited to, those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, and for the establishment of temporary offices, building facilities, safety equipment and first aid supplies, sanitary and other facilities, as required by these specifications, and state and local laws and regulations. The lump sum price bid for Mobilization shall not exceed 2.5 percent of the Base Bid.
   b. No payments will be made under this lump sum item for the costs of bonds and any required insurance and other preconstruction expense necessary for the start of the work, including the cost of construction materials.
   c. No payments will be made under this lump sum item until the base project schedule has been concurred with by the District and Engineer.

2. Payment
   a. Payment of the lump sum price established in the Submitted Bid will be made in accordance with the following schedule:

Percent of Job Completion	Percent of Mobilization Payment
1st Progress Payment with base schedule concurrence	25 Percent
50% of Pipe Constructed*	50 Percent
75% of Pipe Constructed*	75 Percent
Final Payment	100 Percent

* "Pipe Constructed" as defined under Bid Item 3 below

C. Furnish and Install 30" Pipeline via Open Cut Trench from Station 30+00 to Station 996+77.76. This pay items excludes those pipeline sections constructed by other methods (HDD, J&B) which are covered under separate bid items. (Bid Item 3)

1. Measurement of the lump sum price established in the Submitted Bid will be based on a percent complete basis. This work includes but is not limited to construction of 30-in pipeline inclusive of all required fittings, blowoff and sample taps, pressure testing, flushing, dewatering, sheeting and shoring, seeding/sodding, temporary relocation of signage, existing utility relocations, pavement repair and restoration.

   "Pipe Constructed" includes the percentage of constructed 30-in pipeline inclusive of all required fittings, blowoff and sample taps, accepted pressure testing results, flushing, dewatering, sheeting and shoring, seeding/sodding, temporary relocation of signage, existing utility relocations, pavement repair and restoration.

2. Payment of the lump sum price will represent full compensation for construction of pipeline using open cut trench method. Payment will also fully compensate the Contractor for any other work which is not specified or shown but is required to complete the work listed in Bid Item 3.

3. For all pipe installation, the following breakdown shall be used in determining amounts due the Contractor for progress payments:

Work Completed	Percentage Payment of Bid Item (Bid Item Including Pipe Invoice Cost)
Pipe delivered to Site/Mobilization	5 Percent
30% of Pipe Constructed	25 Percent
60% of Pipe Constructed	50 Percent

90% of Pipe Constructed	75	Percent
100% of Pipe Constructed	85	Percent
All pipeline cleanup and restoration satisfactorily completed and Draft Record Drawings submitted	95	Percent
Record Drawings satisfactorily Completed	100	Percent

D. HDD #1 - Furnish and Install 30" HDPE DR 11 Pipeline via HDD (Bid Item 4)

1. Measurement will be based on the lump sum price established in the Submitted Bid. This work includes but is not limited to directional drilling, pipe material transition fittings, pressure testing (inclusive of any temporary valves or restraint required), flushing, connection to existing pipelines, seeding/sodding, temporary relocation of signage, existing utility relocations, pavement repair and restoration.

2. Payment of the unit price will represent full compensation for installation of HDD #1 pipeline. Payment will also fully compensate the Contractor any other work which is not specified or shown but is required to complete the work listed in Bid Item 4.

E. HDD #2 - Furnish and Install 30" HDPE DR 11 Pipeline via HDD (Bid Item 5)

1. Measurement will be based on the lump sum price established in the Submitted Bid. This work includes but is not limited to directional drilling, pipe material transition fittings, pressure testing (inclusive of any temporary valves or restraint required), flushing, connection to existing pipelines, seeding/sodding, temporary relocation of signage, existing utility relocations, pavement repair and restoration.

2. Payment of the unit price will represent full compensation for installation of HDD #2 pipeline. Payment will also fully compensate the Contractor any other work which is not specified or shown but is required to complete the work listed in Bid Item 5.

F. J&B #1 - Furnish and Install 30" Pipeline via Jack and Bore for crossing under State Road 21 (Bid Item 6)

1. Measurement will be based on the lump price established in the Submitted Bid. This work includes but is not limited to jack and bore, dewatering, sheeting and shoring, fittings, pressure testing (inclusive of any temporary valves or restraint required), flushing, connection to existing pipelines, seeding/sodding, temporary relocation of signage, existing utility relocations, pavement repair and restoration.

2. Payment of the unit price will represent full compensation for installation of J&B #1 pipeline. Payment will also fully compensate the Contractor any other work which is not specified or shown but is required to complete the work listed in Bid Item 6.

G. J&B #2 - Furnish and Install 30" Pipeline via Jack and Bore for crossing under State Road 16 (Bid Item 7)

1. Measurement will be based on the lump sum price established in the Submitted Bid. This work includes but is not limited to jack and bore, dewatering, sheeting and shoring, fittings, pressure testing (inclusive of any temporary valves or restraint required), flushing, connection to existing pipelines, seeding/sodding, temporary relocation of signage, existing utility relocations, pavement repair and restoration.

2. Payment of the unit price will represent full compensation for installation of J&B #2 pipeline. Payment will also fully compensate the Contractor any other work which is not specified or shown but is required to complete the work listed in Bid Item 7.

H. Furnish and Install Gate Valves (Bid Item 8)

1. Measurement will be based on the unit price established in the Submitted Bid. This work includes but is not limited to excavation, backfill, valve installation, flushing, testing, and connection to existing pipelines, dewatering, sheeting and shoring, seeding/sodding, temporary relocation of signage, existing utility relocations, pavement repair and restoration.

2. Payment of the unit price will represent full compensation for installation of the valves and valve box. Payment will also fully compensate the Contractor any other work which is not specified or shown but is required to complete the work listed in Bid Item 8.

I. Furnish and Install Air Release/Vacuum Valves (Bid Item 9)

1. Measurement will be based on the unit price established in the Submitted Bid. This work includes but is not limited to excavation, backfill, air release valve installation, valves, corporation stops, curb stops, housing, concrete pads, flushing, testing, and connection to existing pipelines, dewatering, sheeting and shoring, seeding/sodding, temporary relocation of signage, pavement repair, restoration and all other items as shown on the Civil Detail Plans.

2. Payment of the unit price will represent full compensation for installation of the air release valves. Payment will also fully compensate the Contractor any other work which is not specified or shown but is required to complete the work listed in Bid Item 9.

J. Miscellaneous Work and Cleanup

1. No separate payment will be made for Miscellaneous Work and Cleanup. Costs associated providing all labor, equipment, and materials required as listed in Section 02999 and as shown on the plans and/ or specified shall be included in the appropriate bid item.

K. Maintenance of Traffic

1. No separate payment will be made for Maintenance of Traffic. Costs associated with development of a Maintenance of Traffic Plan, revisions required by FDOT, installation, maintenance and removal of all traffic control devices shall be included in the appropriate pipe installation Bid Items.

L. Materials Testing

1. No separate payment will be made for materials testing. Costs associated with employing and paying the services of the independent testing laboratory as specified in Section 01410 and to perform all testing specifically indicated on the Contract Documents shall be included in the appropriate pipe installation Bid Items.

M. Excavation Below Normal Grade and Bedding Rock Refill (Item 11)

1. This is a contingency bid item that may or may not be used on the project. Measurement of excavation below normal grade and refill for open cut trench excavation will extend only downward from the elevation 6-in. below the pipe invert to a depth as shown on the Drawings or, if not shown on the Drawings, determined by the Engineer, and for a width as defined or approved by the Engineer.

2. If the trench bottom is below grade through error by the Contractor, or if improper drainage softens the subgrade and additional excavation in the trenches is required before laying the pipe, such removal and replacement of material will not be measured for payment.

3. No material which may run or flow into the excavation from outside the payment limits shall be measured for payment.

4. Measurement by truck count will not be permitted.

5. Bedding rock placed outside the above limits will not be measured for payment.

6. Payment for excavation below normal grade and bedding rock refill will be made for the quantity as above determined at the price per cubic yard established in the Bid Submittal, which price and payment shall be full compensation for sheeting, dewatering, excavation, rock and boulder removal, and disposal of all materials below normal grade, furnishing and placing bedding rock refill and all work incidental thereto, for which separate payment is not provided under other items in the Bid Submittal.

3.02 ROCK AND BOULDER EXCAVATION

A. No separate measurement and payment shall be made for rock and boulder excavation. Rock is to be excavated as specified in Section 02213.

3.03 TEST PITS

A. Payment for location of existing utilities and locating unknown utilities is included in the bid form as part of each applicable item. The full cost of the work required to verify and supplement the information provided on the drawings, which is based on the best available information, shall be included in the applicable item.

3.04 EXTRA WORK

A. Extra work, if any, will be paid for as specified in the General Conditions.

END OF SECTION

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SECTION 01152
APPLICATION FOR PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor will submit Applications for Payment once a month to the Engineer and District in accordance with the schedule established by Conditions of the Contract and Agreement Between District and Contractor.

B. The accepted Schedule of Values, Section 01370, will be used as the basis for the Contractor's Application for Payment.

1.02 RELATED REQUIREMENTS

A. The Contract Documents include, but are not limited to, the following related requirements:

1. Section 01153: Change Order Procedure.

2. Section 01300: Submittals.

3. Section 01370: Schedule of Values.

4. Section 01390: Construction Photographs.

5. Section 01700: Contract Closeout.

6. Section 02999: Miscellaneous Work and Cleanup.

1.03 FORMAT AND DATA REQUIRED

A. Submit payment applications. Submit payment applications as provided in Engineers Joint Contract Documents Committee (EJCDC) documents or similar in accordance with General Conditions.

B. Provide itemized data on continuation sheet:

1. Format, schedules, line items and values: Those of the Schedule of Values accepted by the Engineer.

C. Provide construction photographs in accordance with Section 01390.

1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of all scheduled component items of Work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.
   a. Round off values to nearest dollar, or as specified for Schedule of Values.

3. List each Change Order executed prior to date of submission, at the end of the continuation sheets.
   a. List by Change Order Number, and description, as for an original component item of work.

4. To receive approval for payment on component material stored on site, submit copies of the original paid invoices with the application for payment.

1.05 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the District or the Engineer requires substantiating data, Contractor will submit suitable information, with a cover letter identifying:

1. Project.

2. Application number and date.

3. Detailed list of enclosures.

4. For stored products:
   a. Item number and identification as shown on application.
   b. Description of specific material.

B. Submit one copy of data and cover letter for each copy of application.

C. The Contractor is to maintain an updated set of drawings to be used as record drawings in accordance with Section 01720. Updated record drawings (red-lines) must be no more than 7 days in the arrears at all times. Failure to maintain red-line drawings up-to-date (7 days in arrears) will be cause to withhold the payment request. Contractor will maintain an updated construction schedule in accordance with Section 01310. As a prerequisite for monthly progress payments, Contractor will submit the updated construction schedule with the applications for progress payments. If the Contractor fails to submit the required updated schedule within the time prescribed, the Engineer may withhold approval of progress payment estimates until such a time as the Contractor submits the required updated schedule.

1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700 - Contract Closeout.

C. Submit all Project Record Documents in accordance with Section 01720.

1.07 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the Engineer and District at the times stipulated in the Agreement.

B. Number: One copies via electronic submittal with digital signatures of each Application. (One copy to the District and one copy to the Engineer).

C. Prior to submitting Applications for Payment, quantities must be approved by the Field Representative of the Engineer or District.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01200
PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Engineer will schedule and administer the pre-construction meeting, periodic progress meetings, and specially called meetings throughout progress of the Work. The Engineer will:

1. Prepare agenda for meetings.

2. Make physical arrangements for meetings.

3. Preside at meetings.

4. Record the minutes; include significant proceedings and decisions.

5. Reproduce and distribute copies of minutes within five working days after each meeting.
   a. To participants in the meeting.
   b. To parties affected by decisions made at the meeting.

B. Representatives of Contractor, subcontractors and suppliers attending meetings will be qualified and authorized to act on behalf of the entity each represents.

C. The Contractor will attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

D. At the discretion of the District and Engineer, a meeting may be held remotely using a TEAMS or similar platform in place of an in-person meeting.

1.02 RELATED REQUIREMENTS

A. The Contract Documents include, but are not limited to, the following related requirements:

1. Information to Bidders.

2. Section 01300: Submittals.

3. Section 01700: Contract Closeout.

4. Section 01730: Operating and Maintenance Data.

5. Section 02413: Horizontal Directional Drilling

1.03 PRE-CONSTRUCTION MEETING

A. Within 10 days of the Effective Date of the Agreement, a joint meeting shall be held with representatives of the Contractor and major subcontractors, the Engineer, the District, and other invited parties or government agencies which may be affected by or have jurisdiction over the Project.

B. Location: A central site, convenient for all parties, designated by the District.

C. Attendance:

1. District's Representative.

2. Engineer and his professional consultants.

3. Resident Project Representative.

4. Contractor's Superintendent.

5. Major Subcontractors.

6. Major suppliers.

7. Utilities.

8. Others as appropriate.

D. Suggested Agenda:

1. Distribution and discussion of:
   a. List of major subcontractors and suppliers.
   b. Projected Construction Schedules.

2. Critical work sequencing.

3. Safety and Health Plans

4. Review of Gates to Camp Blanding and Staging Areas

5. Major equipment deliveries and priorities.

6. Project Coordination.
   a. Designation of responsible personnel.

7. Procedures and processing of:
   a. Field decisions.
   b. Proposal requests.
   c. Submittals.
   d. Change Orders.
   e. Applications for Payment.

8. Adequacy of distribution of Contract Documents.

9. Procedures for maintaining Record Documents.

10. Use of premises:
    a. Office, work and storage areas.
    b. District's requirements.

11. Construction facilities, controls and construction aids.

12. Temporary utilities.

13. Housekeeping procedures.

1.04 PROGRESS MEETINGS

A. Schedule regular periodic meetings. The progress meetings will be held at least monthly with the first meeting no more than 30 days after the pre-construction meeting or no more than 30 days after the date of Effective Date of the Agreement.

B. Hold called meetings as required by progress of the Work.

C. Location of the meetings: Project field office of Contractor or other location designated by the District.

D. Attendance:

1. District or his representative.

2. Engineer, and his professional consultants as needed.

3. Contractor's Superintendent.

4. Subcontractors as appropriate to the agenda.

5. Suppliers as appropriate to the agenda.

6. Others as appropriate.

E. Suggested Agenda:

1. Review, approval of minutes of previous meeting.

2. Review of work progress since previous meeting.

3. Progress, schedule, during succeeding work period.

4. Field observations, problems, conflicts.

5. Problems which impede Construction Schedule.

6. Review of off-site fabrication, delivery schedules.

7. Corrective measures and procedures to regain projected schedule.

8. Revisions to Construction Schedule.

9. Coordination of schedules.

10. Review submittal schedules; expedite as required.

11. Maintenance of quality standards.

12. Pending changes and substitutions.

13. Review proposed changes for:
    a. Effect on Construction Schedule and on completion date.
    b. Effect on other contracts of the Project.

14. Other business.

15. Construction schedule.

16. Critical/long lead items, including ductile iron pipe, fittings and gate valves.

F. The Contractor is to attend progress meetings and is to review previous meeting minutes and current agenda items, in order to be prepared to discuss pertinent topics such as deliveries of materials and equipment, progress of the Work, etc.

G. The Contractor is to provide a current submittal log at each progress meeting in accordance with Section 01300.

1.05 RISK MITIGATION MEETINGS

A. See Section 02413 for additional requirements for Risk Mitigation Meetings.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01300
SUBMITTALS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor will submit to the Engineer for review such working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this Section called data), and material samples (hereinafter in this Section called samples) as are required for the proper control of work, including but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.

B. The Contractor will note that there are specific submittal requirements in other sections of these Specifications.

C. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the District and the Engineer. This log will be organized using the 10 character numbering system in subparagraph 1.06 F. This log should include the following items:

1. Submittal-Description and File Number assigned.

2. Date to Engineer.

3. Date returned to Contractor (from Engineer).

4. Status of Submittal
   a. Approved
   b. Approved As Noted
   c. Approved As Noted/Confirm
   d. Not Approved/Resubmit
   e. Not Approved

5. Date of Resubmittal and Return (as applicable).

6. Date material released (for fabrication).

7. Projected date of fabrication.

8. Projected date of delivery to site.

9. Status of O&M submittal.

10. Project Name and Number.

1.02 SHOP DRAWINGS

A. When used in the Contract Documents, the term "shop drawings" will be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings will be complete and detailed. Shop drawings will consist of fabrication, erection and

setting drawings and schedule drawings, manufacturer's scale drawings, bills of material, wiring and control diagrams, and inspection and test reports including performance curves and certifications as applicable to the Work.

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

C. See Shop Drawing Schedule requirements in subparagraph 1.07 Contractor's responsibility.

1.03 PRODUCT DATA

A. Product data as specified in individual sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data), such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliances and applicability, roughing-in diagrams and templates, catalog cuts, product photographs, standard wiring diagrams, printed performance curves and operational-range diagrams, production or quality control inspection and test reports and certifications, mill reports, product operating and maintenance instructions and recommended spare-parts listing storage instructions, and printed product warranties, as applicable to the work.

1.04 WORKING DRAWINGS

A. When used in the Contract Documents, the term "working drawings" will be considered to mean the Contractor's plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and falsework; for underpinning; and for such other work as may be required for construction but does not become an integral part of the Project.

B. Working drawings will be signed and sealed by a registered Professional Engineer, currently licensed to practice in the State and will convey, or be accompanied by, calculations or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer. Such review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the District and Engineer will have no responsibility therefore.

1.05 SAMPLES

A. The Contractor will furnish, for the approval of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples will be delivered to the Engineer as specified or requested and in quantities and sizes as specified. A minimum of two samples of each item will be submitted unless otherwise specified. The Contractor will pre-pay all shipping charges on samples. Materials or equipment for which samples are required will not be used in work until approved by the Engineer.

B. Samples specified in individual sections, include, but are not necessarily limited to, physical examples of the work such as sections of manufactured or fabricated work, small cuts or

containers of materials, complete units of repetitively-used products, color/texture/pattern swatches and range sets, specimens for coordination of visual effect, graphic symbols, and units of work to be used by the Engineer or District for independent inspection and testing, as applicable to the Work.

C. The Contractor will prepare a transmittal letter in triplicate for each shipment of samples. The Contractor will enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Approval of a sample will be only for the characteristics or use named in such approval and will not be construed to change or modify any Contract requirements.

D. Approved samples not destroyed in testing will be sent to the Engineer or stored at the site of the work. Materials and equipment incorporated in work will match the approved samples. Samples which fail testing or are not approved will be returned to the Contractor at his expense, if so requested at time of submission.

1.06 SUBMITTAL REQUIREMENTS

A. The Contractor will review, approve, and submit, with reasonable promptness and in such sequence as shown on the Shop Drawing Submittal Schedule so as to cause no delay in the Contract Work or in the Work of the District or any separate contractor, all shop drawings, product data, working drawings and samples required by the Contract Documents.

B. The Contractor will submit two copies plus one electronic copy in *.pdf format of all Shop Drawings for the Engineer to review, of which the Engineer will retain one copy.

C. All submittals will be made directly to the Office of the Engineer.

D. Shop drawings, product data, working drawings and samples will be furnished with the following information:

1. Number and title of the drawing.

2. Date of drawing or revision.

3. Name of project building or facility.

4. Name of contractor, subcontractor, and manufacturer submitting drawing.

5. Clear identification of contents, location of the work, and the sheet numbers where the product is found in the contract drawings.

6. Contractor Certification Statement.

7. Submittal Identification Number.

8. Contract Drawing Number Reference.

9. Project Name and Number.

E. In accordance with subparagraph 1.07 A, each shop drawing, working drawing, sample, and catalog data submitted by the Contractor will have affixed to it the following Certification Statement, signed by the Contractor: "Certification Statement: By this submittal, I hereby

represent that I have determined and verified all field measurements, field construction criteria, materials, dimensions, catalog numbers, and similar data and I have checked and coordinated each item with other applicable approved shop drawings and all Contractor requirements."

F. The Contractor will utilize a 4 -character submittal identification numbering system in the following manner:

1. The first character will be a D, S, P, M, or R, which represents Shop/Working Drawing and other Product Data (D), Sample (S), Preliminary Submittal (P), Operating/Maintenance Manual (M), or Request for Information (R).

2. The next five digits will be the applicable Specification Section Number.

3. The next three digits will be the numbers 001-999 to sequentially number each initial separate item or drawing submitted under each specific Section number.

4. The last character will be a letter, indicating the submission, or resubmission of the same Drawing, i.e., A=1st submission, B=2nd submission, C=3rd submission, etc. A typical submittal number would be as follows:

D-03300-008.B

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

G. All items specified are not necessarily intended to be a manufacturer's standard product. Variations from specified items will be considered on an "or equal" basis. If submittals show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor will describe such variations in his letter of transmittal and on the shop drawings along with notification of his intent to seek contract adjustment. If acceptable, proper adjustment in the Contract will be implemented where appropriate. If the Contractor fails to describe such variations he will not be relieved of the responsibility for executing the work in accordance with the Contract, even though such drawings have been reviewed. Variations submitted but not described may be cause for rejection. Any variations initiated by the Contractor will not be considered as an addition to the scope of work unless specifically noted and then approved as such in writing by the Engineer/District.

H. Data on materials and equipment will include materials and equipment lists giving, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, material, size, finish, and all other pertinent data.

I. For all mechanical equipment furnished, the Contractor will provide a list including the equipment name, and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained. In addition, a maintenance and lubrication schedule for each piece of equipment will be submitted as specified in Section 01730.

J. All Manufacturers or equipment suppliers who propose to furnish equipment or products under Division 15 will submit an installation list to the Engineer along with the required shop

drawings. The installation list will include all installations where identical equipment has been installed and has been in operation for a period of at least 1 year.

K. The Contractor will use the color "green" to make his remarks on the Submittals. Only the Engineer will utilize the color "red" in marking submittals.

L. Facsimiles or copies of facsimiles will not be accepted for review.

1.07 CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check, and coordinate with the work of all trades, all drawings, data, schedules and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of any drawing or data sheet larger than 11"x17" will bear Contractor's stamp showing that they have been so checked and approved. Drawings or data sheets 11"x17" and smaller will be bound together in an orderly fashion and bear the Contractor's stamp on the cover sheet. The cover sheet will fully describe the packaged data and include a list of all sheet numbers within the package. Shop Drawings submitted to the Engineer without the Contractor's stamp will be returned to the Contractor, without review at the Engineer's option, for conformance with this requirement.

B. The Contractor will review Shop Drawings, product data, and samples prior to submission to determine and verify the following:

1. Field measurements.

2. Field construction criteria.

3. Manufacturer's catalog numbers and similar data.

4. Conformance with Specifications.

C. Shop Drawings will indicate any deviations in the submittal from the requirements of the Contract Documents.

D. At a time decided upon at the preconstruction meeting the Contractor will furnish the Engineer a Shop Drawing schedule fixing the respective dates for the initial submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule will be provided as a separate entity and indicate those submittals that are critical to the progress schedule. The Contractor will prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery, and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit complete and acceptable submittals sufficiently in advance of the Work.

E. The Contractor will not begin any work affected by a submittal returned not approved. Before starting this work, all revisions must be corrected by the Contractor. After resubmittal they will be reviewed and returned to him by the Engineer. If approved or approved as noted, then the

Contractor may begin this work. Any corrections made to the shop drawings are to be followed without exception.

F. The Contractor will submit to the Engineer all shop drawings and data sufficiently in advance of construction requirements to provide no less than 21 calendar days for review from the time the Engineer receives them. No less than 30 calendar days will be required for major equipment that requires review by more than one engineering discipline.

G. The Contractor will be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the review and approval by Engineer of the necessary Shop Drawings.

H. All Shop Drawings, product data, working drawings and samples submitted by subcontractors for approval will be sent directly to the Contractor for checking. The Contractor will be responsible for their submission according to the approved Shop Drawing schedule so as to prevent delays in delivery of materials and project completion.

I. The Contractor will check all subcontractor's Shop Drawings, product data, working drawings and samples regarding measurements, size of members, materials, and details to satisfy himself that they are in conformance to the Contract Documents. Shop Drawings found to be inaccurate or otherwise in error will be returned to the subcontractors for correction before submission to the Engineer.

J. Requests for Information (RFI) will be submitted on a standard form provided by the Engineer. RFIs will indicate their importance to the timely completion of the project. RFIs will be processed as a Shop Drawing unless there is an urgent need for immediate response.

1.08 ENGINEER'S REVIEW OF SHOP DRAWINGS, PRODUCT DATA, WORKING DRAWINGS AND SAMPLES

A. The Engineer's review is for general conformance with the design concept and contract drawings. Markings or comments will not be construed as relieving the Contractor from compliance with the contract plans and specifications or from departures therefrom. The Contractor remains responsibility for details and accuracy, for coordinating the work with all other associated work and trades, for selecting fabrication processes, for techniques of assembly, and for performing work in a safe manner.

B. The review of Shop Drawings, data, and samples will be general. They will not be construed:

1. as permitting any departure from the Contract requirements;

2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the Shop Drawings, data or samples as submitted describe variations per subparagraph (1.06G), and show a departure from the Contract requirements which the Engineer finds to be in the interest of the District and to be so minor as not to involve a change in Contract Price or

time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. Submittals will be returned to the Contractor under one of the following codes:

Code 1 - "APPROVED" is assigned when there are no notations or comments on the submittal. When returned under this code the Contractor may release the equipment and/or material for manufacture.

Code 2 - "APPROVED AS NOTED" is assigned when notations or comments have been made on the submittal pointing out minor discrepancies as compared with the Contract Documents. Resubmittal or confirmation is not necessary prior to release for manufacturing.

Code 3 - "APPROVED AS NOTED/CONFIRM." This combination of codes is assigned when a confirmation of the notations and comments is required by the Contractor. The Contractor may release the equipment or material for manufacture; however, all notations and comments must be incorporated into the final product. This confirmation is to address the omissions and/or nonconforming items that were noted. Only the items to be "confirmed" need to be resubmitted.

Code 4 - "NOT APPROVED/RESUBMIT." This combination of codes is assigned when the submittal is in noncompliance with the Contract Documents and must be corrected and the entire package resubmitted. This code generally means that the equipment or material cannot be released for manufacture unless the Contractor takes full responsibility for providing the submitted items in accordance with Contract Documents.

Code 5 - "NOT APPROVED" is assigned when the submittal does not meet the intent of the Contract Documents. The Contractor must resubmit the entire package revised to bring the submittal into conformance. It may be necessary to resubmit using a different manufacturer/vendor to meet the Contract Documents.

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

Code 7 - "FOR YOUR INFORMATION" is assigned when the package provides information of a general nature that may or may not require a response.

Codes 1 through 5 designate the status of the reviewed submittal with Code 6 showing there has been an attachment of additional data. Code 7 is used as may be necessary.

E. Resubmittals will be handled in the same manner as first submittals. On resubmittals the Contractor will direct specific attention, in writing on the letter of transmittal and on resubmitted Shop Drawings by use of revision triangles or other similar methods, to revisions other than the corrections requested by the Engineer on previous submissions. Any such revisions which are not clearly identified will be made at the risk of the Contractor. The Contractor will make corrections to any work done because of this type of revision that is not in accordance to the Contract Documents as may be required by the Engineer.

F. If the Contractor considers any correction indicated on the shop drawings to constitute a change to the Contract Documents, the Contractor will give written notice thereof to the Engineer and District at least 7 working days prior to release for manufacture.

G. The Engineer will review a submittal a maximum of 2 times after which cost of review will be borne by the Contractor. The cost of engineering will be equal to the Engineer's charges to the District under the terms of the Engineer's agreement with the District. The District will issue a Change Order at the end of the Contract to cover the extra Engineer's reviews.

H. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor will carry out the construction in accordance therewith and will make no further changes therein except upon written instructions from the Engineer.

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310
CONSTRUCTION SCHEDULES (BAR CHART)

PART 1 GENERAL

1.01 WORK INCLUDED

A. Within five days after the Effective Date of the Agreement, prepare and submit to the Engineer estimated construction progress schedules for the Work, with subschedules of related activities which are essential to its progress.

B. Submit revised progress schedules on a monthly basis.

C. No partial payments will be approved by the Engineer until there is an approved construction progress schedule on hand.

D. The Contractor will designate an authorized representative of his firm who will be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor will have direct project control and complete authority to act on behalf of the Contractor in fulfilling the commitments of the Contractor's schedule.

1.02 RELATED REQUIREMENTS

A. Standard General Conditions of the Construction Contract.

B. Section 01010: Summary of Work.

C. Section 01200: Project Meetings.

D. Section 01300: Submittals.

1.03 FORM OF SCHEDULES

A. Schedule diagrams and reports shall be generated using the latest version of Microsoft Project, Suretrak or Primavera Project Planner.

B. Prepare schedules in the form of a horizontal bar chart.

1. Provide a separate horizontal bar for each trade or operation within each structure or item.

2. Horizontal time scale: In weeks from the start of construction and identify the first work day of each month.

3. Scale and spacing: To allow space for notations and future revisions.

4. Minimum sheet size: 11 inches x 17 inches.

C. Format of listings: The chronological order of the start of each item of work for each structure.

D. Identification of listings: By major specification section numbers as applicable and structure.

1.04 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity.

2. Show the dates for the beginning of, and completion of, each major element of construction in no more than a two-week increment scale.

3. Show projected percentage of completion for each item, as of the first day of each month.

4. Show projected dollar cash flow requirements for each month of construction.

B. Submittals Schedule for Shop Drawings, and Samples in accordance with Section 01300. Show:

1. The dates for Contractor's submittals.

2. The dates submittals will be required for District-furnished products, if applicable.

3. The dates approved submittals will be required from the Engineer.

C. A typewritten list of all long lead items (equipment, materials, etc.)

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of a schedule:

1. Major changes in scope.

2. Activities modified since previous submission.

3. Revised projections of progress and completion.

4. Other identifiable changes.

C. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.

2. Corrective action recommended, and its effect.

3. If the project is delayed, indicate nature of the delay, the anticipated duration of the delay, Contractor's intended action to mitigate the delay, and acknowledge any claims the Contractor has against the District.

1.06 SUBMISSIONS

A. Submit initial schedules to the Engineer within five days after the Effective Date of the Agreement.

1. The Engineer will review schedules and return review copy within 14 days after receipt.

2. If required, resubmit within seven days after return of review copy.

B. Submit revised monthly progress schedules with that month's application for payment.

C. Submit two printed hard copies and one electronic copy, in PDF format, for both the initial and monthly submittals for review.

1.07 DISTRIBUTION

A. Distribute copies of the reviewed schedules to:

1. Engineer (one copy)

2. Job's site file.

3. Subcontractors.

4. Other concerned parties.

5. District (one copy).

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 RESPONSIBILITY FOR SCHEDULE COMPLIANCE

A. The Contractor agrees that whenever it becomes apparent from the current monthly schedule that delays to the critical path have resulted, and hence, that the contract completion date will not be met or when so directed by the Engineer, he/she will take some or all of the following actions at no additional cost to the District, submitting to the Engineer for approval, a written statement of the steps he/she intends to take to remove or arrest the delay to the critical path in the approved schedule.

1. Increased construction manpower in such quantities and crafts as will substantially eliminate, in the judgment of the Engineer, the backlog of work.

2. Increase the number of working hours per shift, shifts per working days per week, the amount of construction equipment, or any combination of the foregoing, sufficiently to substantially eliminate, in the judgment of the Engineer, the backlog of work.

3. Reschedule activities to achieve maximum practical concurrency of accomplishment of activities, and comply with the revised schedule.

4. Costs incurred by the District arising from such lengthening of hours, including furnishing of Inspectors, will be the Contractor's responsibility and will be deducted from monies due him. Failure of the Contractor to comply with the requirements of the Engineer may be

grounds for determination by the District that the Contractor is not proceeding at such rates as will ensure completion within the specified time and may result in the termination of the right of the Contractor to continue the work.

3.02 ADJUSTMENT OF CONTRACT SCHEDULE AND COMPLETION TIME

A. If the Contractor desires to make changes in his method of operating which effect the approved schedule, he will notify the Engineer and District in writing, stating what changes are proposed and the reason for the change. If the Engineer approves these changes, the Contractor will revise and submit for approval, without additional cost to the District, all of the affected portion of the schedule. The schedule will be adjusted by the Contractor only after prior approval of his proposed changes by the Engineer and District.

B. Adjustments may consist of changing portions of the activity sequence and/or activity durations, division of approved activities, or other adjustments as may be approved by the Engineer. The addition of extraneous, non-working activities and/or activities which add unapproved restraints to the schedule will not be approved.

C. If the completion of any activity, whether or not critical, falls more than 100 percent behind its approved duration, the Contractor will submit for approval a schedule adjustment showing each such activity divided into two activities reflecting completed versus uncompleted work.

D. Shop Drawings which are not approved on the first submittal or within the scheduled time will be immediately rescheduled.

E. The contract completion time will be adjusted only for causes specified in this contract. In the event the Contractor requests an extension of any contract completion date, he/she will furnish such justification and supporting evidence as the Engineer may deem necessary for a determination as to whether the Contractor is entitled to an extension of time under the provisions of this contract. The Engineer will, after receipt of such justification and supporting evidence make findings of fact and will advise the Contractor in writing thereof. If the Engineer finds that the Contractor is entitled to any extension of any contract completion date under the provisions of this Contract, the Engineer's determination as to the total number of days extension will be based upon the currently approved schedule and on all data relevant to the extension. Such data will be included in the next monthly updating of the schedule. Any extension ofContract Time must be approved by the District and a Change Order must be processed. The Contractor acknowledges and agrees that actual delays in activities which, according to the schedule, do not affect any contract completion date shown by the critical path in the schedule do not have any effect on the Contract completion date or dates, and therefore, will not be the basis for a change.

F. From time to time it may be necessary for the contract schedule and/or completion time to be adjusted by the Engineer to reflect the effects of job conditions, weather, technical difficulties, strikes, unavoidable delays on the part of the District or his representatives, and other unforeseeable conditions which may indicate schedule adjustments and/or completion time extension. Under such conditions, the Contractor will reschedule the work and/or Contract completion time to reflect the changed conditions, and the Contractor will revise his schedule accordingly. No additional compensation will be made to the Contractor for such schedule changes except for unavoidable overall contract time extensions beyond the actual completion of all unaffected work in the Contract, in which case the Contractor will take all possible action to minimize any time extension and any additional cost to the District. It is specifically pointed

out that the use of available float time in the schedule may be used by the District as defined by the Engineer, as well as by the Contractor. Float time is defined as the amount of time between the early start date, and the late start date, or the early finish date and the late finish date, of any of the activities in the schedule.

G. The District controls the float time in the approved schedule and, therefore, without obligation to extend either the overall completion date or any intermediate completion dates set out in the schedule, the District may initiate changes to the contract work that absorb float time only. District-initiated changes that affect the critical path on the approved schedule will be the sole grounds for extending (or contracting) said completion dates. Contractor-initiated changes that encroach on the float time identified in the approved schedule may be accomplished with the District's concurrence. Such changes, however, will give way to District-initiated changes competing for the same float time.

END OF SECTION

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SECTION 01370
SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor will submit to the Engineer and District a Schedule of Values allocated to the various portions of the Work, within seven calendar days after the effective date of the Agreement.

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

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

1.02 RELATED REQUIREMENTS

A. The Contract Documents include, but are not limited to, the following related requirements:

1. Standard General Conditions.

2. Section 01152: Applications for Payment.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Format schedule on an 8-1/2 inch x 14 inch white paper. Identify schedule with:

1. Title of Project and location.

2. Engineer and Project number.

3. Name and Address of Contractor.

4. Contract designation.

5. Date of submission.

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

C. Identify each line item with the number and title of the respective major section of the specifications.

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

E. For the various portions of the Work:

1. Each item will include a directly proportional amount of the Contractor's overhead and profit.

2. For items on which progress payments will be requested for stored materials, break down the value into:
    a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials upon request by the Engineer.
    b. The total installed value.

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

1.04 SUBSCHEDULE OF UNIT MATERIAL VALUES

A. Submit a sub-schedule of unit costs and quantities for:

1. Products on which progress payments will be requested for stored products.

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

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

D. The unit values for the materials will be broken down into:

1. Cost of the material, delivered and unloaded at the site, with taxes paid.

2. Copies of invoices for component material will be included with the payment request in which the material first appears.

3. Paid invoices will be provided with the second payment request in which the material appears or no payment will be allowed and/or may be deleted from the request.

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

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01380
PRE- AND POST-CONSTRUCTION VIDEO PHOTOGRAPHY

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required to videotape all construction areas within the project area, as shown in the Drawings and as specified herein, prior to any construction work and after all construction work is finished.

1.02 QUALIFICATIONS

A. The photography shall be done by a competent camera operator who is fully experienced and qualified with the specified equipment.

B. The audio shall be recorded in the presence of the District or Engineer in a clear and easily understood manner.

1.03 COST OF PHOTOGRAPHY

A. The cost of the photography shall be a subsidiary obligation of the Contractor, and no separate payment will be made. Parties requiring additional copies will pay photographer directly.

1.04 AUDIO-VISUAL VIDEOS (DVDs)

A. DVD recordings shall not be made more than 60 days prior to construction or after substantial completion. No construction shall begin prior to review and approval of the videos covering the construction area by the Engineer. The Engineer shall have the authority to reject all or any portion of a DVD not conforming to specifications and order that it be redone at no additional charge. The Contractor shall reschedule unacceptable coverage within five days after being notified. The Engineer shall designate those areas, if any, to be omitted from or added to the audio-visual coverage. All DVDs and written records shall be immediately submitted to and become the property of the District.

B. The Contractor shall produce professional-grade videos (DVDs). The color audio-visual DVDs shall be reproduced by a responsible commercial firm regularly engaged in the business of color audio-video tape documentation.

PART 2 PRODUCTS

2.01 DVDs

A. The DVD shall be of professional quality.

2.02 AUDIO-VISUAL RECORDING

A. The audio-visual system and the procedures employed in its use shall be such as to produce a finished product that will meet professional standards. The video portion of the recording shall produce bright, sharp, clear pictures with accurate colors and shall be free from distortion or any other form of picture imperfection. All video recordings shall, by electronic means, display on the screen the time of day, the month, day and year of the recording. This time and date

information must be continuously and simultaneously generated with the actual recording. The audio portion of the recording shall be of high clarity and be free from distortion.

PART 3 EXECUTION

3.01 VIDEO RECORDING

A. The recordings shall contain coverage of all visible features within the construction zone of influence. These features shall include, but not be limited to, all roadways, pavement, retention ponds, railroad tracks, curbs, driveways, sidewalks, culverts, head-walls, retaining walls, landscaping, trees, fences, visible utilities, structures and all buildings. Of particular concern shall be the condition of existing vegetation, terrain, and structures and the existence or non-existence of any faults, fractures or defects. Panning, zoom-in and zoom-out rates shall be sufficiently controlled to maintain a clear view of the subjects.

3.02 FINAL PRODUCT

A. The final product shall be two sets of fully edited audio/video DVDs, one set pre-construction and one set post-substantial completion.

B. Three copies of each set shall be delivered to the Engineer.

END OF SECTION

SECTION 01390
CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Furnish a competent photographer to take construction record photographs periodically during course of the Work.

1.02 PHOTOGRAPHY REQUIRED

A. Provide photographs taken on cutoff date for each scheduled Application for Payment.

B. For each project location, provide monthly photographs at each major stage of activity prior to any construction in addition to the preconstruction video of the entire project.

C. Views and quantities required:

1. At each specified time, photograph project from a minimum of three different views all Work and at least one view every 100 feet for all pipeline Work, as approved by the Engineer.

2. Provide three USB drives containing digital photographs of each view for the monthly submittal.

D. File Storage:

1. The photographer shall maintain file copies for a period of two years from Date of Substantial Completion of entire project and then shall convey all files to the District.

2. If requested, Photographer shall agree to furnish up to two hard copy prints to the District and the Engineer at no additional cost. Photographer shall also agree to participate as required in any litigation requiring the photographer as an expert witness.

1.03 COSTS OF PHOTOGRAPHY

A. The Contractor shall pay costs for specified digital photography and prints, if needed.

1. Parties requiring additional photography, USB drives, or prints will pay photographer directly.

PART 2 PRODUCTS

2.01 DIGITAL FILES ON USB DRIVE

A. All digital files or prints shall include the following:

1. Name of Project.

2. Orientation of View.

3. Date and time of exposure.

4. Name and address of photographer.

5. Photographer's numbered identification of exposure.

B. HARD COPIES (if requested) shall meet the following requirements:

1. Paper: Single weight, color print paper.

2. Finish: Smooth surface, glossy.

3. Size: 8 inch x 10 inch.

PART 3 EXECUTION

3.01 TECHNIQUE

A. Factual presentation.

B. Correct exposure and focus.

1. High resolution and sharpness.

2. Maximum depth-of-field.

3. Minimum distortion.

3.02 VIEWS REQUIRED

A. Photograph from locations to adequately illustrate condition of construction and state of progress.

1. At successive periods of photography, take at least one photograph from the same overall view as previously.

2. Consult with the Engineer at each period of photography for instructions concerning views required.

3.03 DELIVERY OF USB DRIVES

A. Deliver three USB Drives to the Engineer to accompany each Application for Payment.

B. Distribution of USB Drives as soon as processed is anticipated to be as follows:

1. District (one USB Drive with digital files).

2. Engineer (one USB Drive with digital files).

3. Project Record File (one USB Drive with digital files to be stored by Contractor on-site).

C. No construction shall start until pre-construction photographs are completed and submitted to the Engineer.

3.04 ASSEMBLY OF PRINTS (IF REQUESTED)

A. Each print shall be inserted in a separate, archival type, nonglare, photo protector.

B. Provide one suitable size binder for each set of prints. Binders shall be provided in sufficient quantity to hold all photographs taken for the duration of the contract. Each binder shall be labeled by engraving on the front and spine with the project name.

3.05 OWNERSHIP OF FILE AND PRINTS

A. All digital and printed photos generated under this specification shall become the property of the District and all copyrights assigned thereto.

END OF SECTION

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SECTION 01400
CONTRACTOR QUALITY CONTROL

PART 1 GENERAL

1.01 QUALITY CONTROL PLAN

A. General: Furnish for approval by the Engineer, the Contractor Quality Control (CQC) Plan within 10 calendar days after award of contract. The plan shall identify personnel, procedures, instructions, records, and forms to be used. The Engineer may refuse to allow construction to start until such time as an acceptable final plan is submitted.

B. The Contractor Quality Control Plan: This plan shall include as a minimum the following:

1. A description of the quality control organization, including chart showing lines of authority and acknowledgment that the CQC staff shall report to the Project Manager or someone higher in the Contractor's organization.

2. The name, qualifications, duties, responsibilities and authorities of each person assigned a CQC function.

3. A copy of a statement signed by an authorized official of the Contractor's firm, which describes the responsibilities and delegates the authorities of the CQC System Manager.

4. Procedures for scheduling and managing submittals, including those of subcontractors, offsite fabricators, suppliers and purchasing agents.

5. Control testing procedures for each specific test. (Testing laboratories must be approved by the District.)

6. Reporting procedures including proposed reporting formats.

7. Hazard Communication Program required under OSHA requirements.

C. Acceptance of Plan: Acceptance of the plan by the District and Engineer is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction.

D. Notification of Changes: After acceptance of the CQC plan, notify the District in writing of any proposed change. Proposed changes are subject to acceptance by the District.

1.02 QUALITY CONTROL ORGANIZATION

A. CQC System Manger: CQC System Manager shall be responsible for overall management of the CQC and have the authority to act in all CQC matters for the Contractor. This person shall demonstrate his/her ability to perform correctly the duties required of him/her to the satisfaction of the District and shall be physically at the project site whenever work is in progress and will be in charge of the Contractor's Quality Control program for this project. All the Contractor’s submittals for approval shall be reviewed and modified or corrected as needed by him/her or his/her authorized assistants and approved correct prior to forwarding of such submittals to the District.

B. Personnel: The personnel of the CQC staff shall be fully qualified by experience and technical training to perform their assigned responsibilities and shall be directly hired by and work for the Contractor.

1.03 SUBMITTALS

A. Submit in accordance with Section 01300. The CQC Organization shall be responsible for certifying that all submittals are in compliance with the contract requirements.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CONTROL

A. Contractor Quality Control is the means by which the Contractor assures himself that his/her construction complies with the requirements of the Contract Drawings and Sections. The controls shall be adequate to cover all construction operations, including both onsite and offsite operations and will be keyed to the proposed construction sequence. The controls shall include at least three phases of inspection for all definitive features of work as follows:

1. Preparatory Inspection: This shall be performed prior to beginning any definable feature of work. It shall include a review of contract requirements; a check to assure that all materials and/or equipment have been tested, submitted and approved; a check to assure that provisions have been made to provide required control testing; examination of the work area to ascertain that all preliminary work has been completed and a physical examination of materials, equipment and sample work to assure that they conform to approved shop drawings or submittal data and that all materials and/or equipment are on hand.

2. Initial Inspection: This shall be performed as soon as a representative portion of the particular feature of work has been accomplished and shall include examination of the quality of workmanship and a review of control testing for compliance with contract requirements, use of defective or damaged materials, omissions, and dimensional requirements.

3. Follow-up Inspection: These shall be performed daily to assure continuing compliance with contract requirements, including control testing, until completion of the particular feature of work. Such inspection shall be made a matter of record in the CQC documentation as required below. Final follow-up inspections shall be conducted and deficiencies corrected prior to the addition of new features of work.

3.02 TESTS

A. Test Procedures: Perform tests specified or required to verify that control measures are adequate to provide a product which conforms to contract requirements. Contractor shall procure the services of an industry recognized testing laboratory per Section 01445. A list of tests which the Contractor understands he/she is to perform shall be furnished as a part of the CQC plan to the District. The list shall give the test name, specification paragraph containing the test requirements and the personnel and laboratory responsible for each type of test. Perform the following activities and record and provide the following data:

1. Verify that testing procedures comply with contract requirements.

2. Verify that facilities and testing equipment are available and comply with testing standards.

3. Verify that test instrument calibration data are checked against certified standards.

4. Verify that recording forms, including all of the test documentation requirements, have been prepared.

3.03 COMPLETION INSPECTION

A. At the completion of all work or any increment thereof established by a completion time stated in the paragraph entitled "Commencement, Prosecution and Completion of Work" or stated elsewhere in the Contract Sections, the CQC System Manager shall conduct a completion inspection of the work and develop a "punch list" of items which do not conform to the approved Drawings and Sections. Such a list shall be included in the CQC documentation and shall include the estimated date by which the deficiencies will be corrected. The CQC System Manager or his/her staff shall make a second completion inspection to ascertain that all deficiencies have been corrected and so notify the District. The completion inspection and any deficiency corrections required by this paragraph will be accomplished within the time stated for completion of the entire work or any particular increment thereof if the project is divided into increments by separate completion dates.

3.04 DOCUMENTATION

A. Maintain current records of quality control operations, activities and tests performed including the work of suppliers and subcontractors. These records shall be on an acceptable form (form attached) and indicate a description of trades working on the project, the numbers of personnel working, the weather conditions encountered, any delays encountered and acknowledgment of deficiencies noted along with the corrective actions taken on current and previous deficiencies. In addition, these records shall include factual evidence that required activities or tests have been performed, including but not limited to the following:

1. Type and number of control activities and tests involved.

2. Results of control activities or tests.

3. Nature of defects, causes for rejection, etc.

4. Proposed remedial action.

5. Corrective actions taken.

B. These records shall cover both conforming and defective or deficient features and shall include a statement that supplies and materials incorporated in the work comply with the requirements of the contract. Legible copies of these records shall be furnished to the District daily.

3.05 NOTIFICATION OF NONCOMPLIANCE

A. The District or Engineer will notify the Contractor of any noncompliance with the foregoing requirements. After receipt of such notice, immediately take corrective action. Such notice,

when delivered to the Contractor or his/her representative at the site of the work, shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the District may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No part of the time lost due to any such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

END OF SECTION

(*Report Form Follows*)

QUALITY CONTROL DAILY REPORT

(CONTRACTOR)

REPORT NO. _____ CONTRACT NO. _____ DATE _____

LOCATION OF WORK: _____

DESCRIPTION: _____

WEATHER_____, RAINFALL_____INCHES, TEMP: MIN_____ MAX_____

1. Work Performed Today by Prime Contractor (Include Labor Breakdown):
   _____

2. Work Performed Today by Subcontractors (Include Labor Breakdown):
   _____

3. List Specific Inspection Performed and Results of these Inspections. (Include Corrective Actions):
   _____

4. List Type and Location of Tests Performed and Results of these Tests:
   _____

5. Verbal Instructions Received from District or Engineer on Construction Deficiencies or Re-testing Required:
   _____

6. Remarks:_____

7. CERTIFICATION: I certify that the above report is complete and correct and that I, or my authorized representative, have inspected the work performed this day by the Contractor and each subcontractor and have determined that all materials, equipment and workmanship are in strict compliance with the plans and specifications except as may be noted above.

_____
Contractor's Designated Quality Control

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SECTION 01410
TESTING AND INDEPENDENT TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Contractor will employ and pay for the services of an Independent Testing Laboratory to perform all testing specifically indicated on the Contract Documents or specified in the Specifications. Costs for services provided by Independent Testing Laboratory are reimbursable as provided under Section 01150.

B. District or Engineer may also elect to have additional testing performed at District's expense. When District or Engineer elect to perform additional testing, Contractor shall coordinate with District's or Engineer's personnel.

C. Correction of any deficiencies revealed by testing performed by Contractor, District, or Engineer shall be performed by Contractor at no additional cost to District.

1.02 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM C1077 – Standard Practice for Laboratories Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Laboratory Evaluation.

2. ASTM E329 – Standard Specification for Agencies Engaged in Construction Inspection and/or Testing.

1.03 SUBMITTALS

A. Certifications

1. Certify that the Contractor is not associated with the independent testing laboratory proposed for use by the Contractor nor does the Contractor or officers of the Contractor's organization have a beneficial interest in the laboratory.

B. Qualifications

1. Independent Testing Laboratory
   a. Name and address
   b. Names and positions of principal officers and the name, position, and qualifications of the responsible registered professional engineer in charge.
   c. Listing of technical services to be provided. Indicate external technical services to be provided by other organizations.
   d. Names and qualifications of the supervising laboratory technicians.
   e. Statement of conformance provided by evaluation authority defined in ASTM C1077. Provide report prepared by evaluation authority when requested by the Engineer.
   f. Submit as required above for other organizations that will provide external technical services.

1.04 QUALITY ASSURANCE

A. All field testing and inspection services and related laboratory tests required will be provided by the Contractor. The cost of such work will be paid for by the Contractor. Methods of testing will comply with the latest applicable ASTM methods.

B. Independent testing laboratory shall meet the requirements of ASTM E329 and ASTM C1077 and be acceptable to the Engineer. Laboratories affiliated with the Contractor or in which the Contractor or officers of the Contractor's organization have a beneficial interest are not acceptable.

C. Provide all field testing and inspection services and related laboratory tests. Methods of testing shall comply with the latest applicable ASTM methods.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. Cooperate with laboratory personnel, provide access to Work.

B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other materials mixes which require control by the independent testing laboratory.

D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the District shall be allowed on account of such testing and certification.

E. Furnish incidental labor and facilities:

1. To provide access to Work to be tested.

2. To obtain and handle samples at the Project site or at the source of the product to be tested.

3. To facilitate inspections and tests.

4. For storage and curing of test samples.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01445
PIPELINE TESTING AND CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and test and clean all new pipelines installed under this Contract as specified herein.

1.02 RELATED WORK

A. Pipelines are included in Division 2.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. Furnish all necessary equipment and labor for cleaning and testing the pipelines. The procedures and methods shall be approved by the Engineer.

B. Make any taps and furnish all necessary caps, plugs, etc, as required in conjunction with testing pipelines. Furnish a test pump, gauges and any other equipment required in conjunction with carrying out the hydrostatic tests.

3.02 CLEANING PIPELINES

A. As pipe laying progresses and at the conclusion of the work thoroughly clean all new pipelines by flushing with water, “pigging” other means to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period. If, after this cleaning, obstructions remain, it shall be removed.

B. To minimize the quantity of water required for pipe flushing, Contractor shall cap the ends of constructed pipe at the end of each workday to keep pipe clean and free of debris.

3.03 TESTING PRESSURE PIPELINES

A. All pressure pipelines shall be pressure and leakage tested as specified in the respective pipe material specification section.

END OF SECTION

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SECTION 01500
TEMPORARY UTILITIES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor will furnish, install and maintain temporary utilities required for construction, and remove on completion of Work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electric Code.

B. Comply with Federal, State and local codes and regulations and with utility company requirements.

C. Comply with Florida Department of Environmental Protection requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with utility company and District to provide service required for power and lighting, and pay all costs for service and for power used in the construction, testing and trial operation prior to final acceptance of the work by the District as stipulated by the Engineer.

B. Contractor will need to provide a temporary power source (i.e., generator) where no power source is available.

C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.

2.03 TEMPORARY HEAT AND VENTILATION

A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work.

B. Portable heaters will be standard approved units complete with controls.

C. Pay all costs of installation, maintenance, operation and removal, and for fuel consumed.

D. Provide connections to existing facilities; extend and supplement with temporary units as required to comply with requirements. Pay all costs of installation, maintenance, operation and removal.

2.04 TEMPORARY WATER

A. The District has identified an existing CCUA hydrant located within Keystone Heights at the intersection of State Road 21 and Firetower Road that may be utilized as a water source during construction. Additional details will be provided during the pre-bid meeting. Contractor may opt to locate additional water sources which may include negotiation with owners of nearby private wells to obtain a potable water source and/or water required for pipeline pressure testing.

B. The Contractor will be responsible for coordinating and direct payment for all water used and associated costs directly with the owner of the water source. Refer to Section 01500 Attachment A for the CCUA Fire Hydrant Meter Application and Rates.

C. Note that the rate at which the water is available may be insufficient for construction purposes. The Contractor shall provide adequate storage and pumping necessary to perform the work.

2.05 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities in compliance with laws and regulations.

B. Service, clean and maintain facilities and enclosures.

2.06 TEMPORARY PETROLEUM STORAGE TANKS

A. Any petroleum storage tanks with a capacity of 55 gallons or greater that Contractor brings onto District (Camp Blanding) property must be either double-walled or kept within secondary containment that will contain 110% of the tank volume.

PART 3 EXECUTION

3.01 GENERAL

A. Maintain and operate systems to assure continuous service.

B. Modify and extend systems as work progress requires.

3.02 REMOVAL

A. Completely remove temporary materials and equipment when their use is no longer required as determined by the Engineer.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

Clay County Utility Authority

3176 Old Jennings Road
Middleburg, Florida 32068
Telephone (904) 213-2466 Fax (904) 213-2467

Fire Hydrant Meter Policy and Procedures

Deposit and Meter Reading Plan Choice

Due to a variety of hydrant meter applications, we have provided two plans to better accommodate your specific hydrant meter needs.

Plan A* (Lessee installs meter and assumes all risk of loss)	**Plan B**** (CCUA installs meter)
Deposit - A deposit is required for all issued hydrant meter assemblies. Monthly water usage charges, fees, etc. will not be deducted from the deposit. Upon return, deposit will be credited towards the final bill. If a credit is still due, a refund check will be provided after the boards approval.	**Deposit** - A deposit is required for all issued hydrant meter assemblies. Monthly water usage charges, fees, etc. will not be deducted from the deposit. The deposit will be credited towards the final bill ONLY when the lessee calls CCUA to disconnect the meter. If a credit is still due, a refund check will be provided after the boards approval.
Meter Setup - Lessee is responsible for proper setup (using procedural steps provided by CCUA) including sufficient bracing to support meter assembly.	**Meter Setup** - A CCUA Technician will install the meter.*** This includes flushing the hydrant and installing the meter on the hydrant.
Meter Relocation - CCUA hydrant meters are to be used only in the CCUA service area on hydrants that are located on existing water mains or mains that have been cleared for use.	**Meter Relocation** - If it becomes necessary to relocate the meter to a different hydrant, Lessee must contact CCUA to arrange for a CCUA technician to remove and relocate.***
Meter Reading - Every 30 days, the meter reading *MUST BE PROVIDED* to CCUA. Failure to provide read will result in additional charges.*** Reads not provided within 60 days of the last read will be considered lost and/or stolen.*	**Meter Reading** - Every 30 days, the meter reading *MUST BE PROVIDED* to CCUA. Failure to provide a read will result in CCUA sending a field technician to obtain a read.***

*Violations of the conditions of Plan "A" will result in a conversion to Plan "B", or cancellation of the agreement with hydrant privileges denied.

**If a meter is lost, stolen or damaged under this plan, a replacement meter may only be issued under Plan "A" conditions.

***See Hydrant Meter Policy Rate Schedule for current rates and service charges that apply.

Clay County Utility Authority

3176 Old Jennings Road
Middleburg, Florida 32068
Telephone (904) 213-2466 Fax (904) 213-2467

FIRE HYDRANT METER POLICY RATE SCHEDULE

Description of Fee or Charge	Amount
"Plan A" Deposit (Lessee installs meter)	**$1,100.00**
"Plan B" Deposit (CCUA installs meter)	**$500.00**
Application Fee	**$30.00**
Meter Assembly Base Facility Charge (Per day)	**$2.93**
Water Usage Charge (Per 1,000 Gallons)	**$2.06**
Meter Setup/Relocation Fee	**$30.00**
Meter Reading/Field Visit for Meter Inspection Fee***	**$30.00**
Lost Wrench Fee	**$30.00**
Late fee	**$30.00**
Meter Assembly Damage Fee- The Greater of either Replacement or	**$115.00**

Plan "A": Security deposit and Application fee: $1,130.00
Plan "B": Security deposit, Application Fee and Meter Set up Charge: $560.00

(***Field Visit will be necessary if meter reading is not provided by required due date)

Clay County Utility Authority
3176 Old Jennings Road
Middleburg, Florida 32068
Telephone (904) 213-2466 Fax (904) 213-2467

CCUA FIRE HYDRANT METER APPLICATION

Applicant Information

Applicant (Legal Company Name)		Federal I.D #		License#
Business Address		**City**	**State**	**Zip Code**
Jobsite Contact Name	**Jobsite Contact Mobile**	**Office/ Billing Phone**		**Office/ Billing Email**

Job Site Information/Requirements

Job Site and Hydrant Location

Email of contact providing monthly reads:

Estimated Job Duration	Week(s)	Month(s)	If duration exceeds 1 year, meter must be returned to CCUA for inspection, reading and reissuing.

Initial Charges		Current Usage Charges	
Fire Hydrant Meter Assembly Deposit		**Water Usage Charge (per 1,000 Gal)**	
Application Fee		**Base Facility Charge (Per Day)**	
Meter Setup Fee (CCUA Installation)		**(Rates Subject to Change)**	
Total			

Initials	Plan A	Initials	Plan B
	I will be responsible to set up meter, myself.		I request CCUA to setup meter on job site.
	I will provide monthly meter readings to CCUA.		I will provide monthly meter readings to CCUA.
	I will or will not require a hydrant wrench. (Circle option)		I will or will not require a hydrant wrench. (Circle option)
	I will return meter assembly, myself upon job completeion.		I will call CCUA to uninstall meter upon job completion

If any part of the assembly is deemed defective, all repair fees shall be added to the final bill. If the meter assembly and wrench are not returned, the deposit shall become non-refundable and an average daily consumptive use and meter assembly base charge will be billed to lessee.

I have fully read Clay County Utility Authority's Fire Hydrant Meter Policy and Cross-Connection Control Policy, and on behalf of my company, do hereby agree to abide by the procedures as stipulated in the same. Furthermore, I accept full responsibility for failure to comply with these policies.

Print Name _____ Date _____

Signature _____ Name of CCUA Representative (Issuing meter) _____

CCUA BILLING INFORMATION

Meter #_____ Reading & Date _____ Backflow #_____

Read Date	Reading	Consumption

Read Date	Reading	Consumption
FINAL		

Print name and Signature of Person Returning Meter _____ Date _____ Name of CCUA Rep (Receiving Meter) _____

Form **W-9**
(Rev. August 2013)
Department of the Treasury
Internal Revenue Service

Request for Taxpayer Identification Number and Certification

Give Form to the requester. Do not send to the IRS.

Print or type
See Specific Instructions on page 2.

Name (as shown on your income tax return)

Business name/disregarded entity name, if different from above

Check appropriate box for federal tax classification:
☐ Individual/sole proprietor ☐ C Corporation ☐ S Corporation ☐ Partnership ☐ Trust/estate

☐ Limited liability company. Enter the tax classification (C=C corporation, S=S corporation, P=partnership) ▶ _____

☐ Other (see instructions) ▶

Exemptions (see instructions):
Exempt payee code (if any) _____
Exemption from FATCA reporting code (if any) _____

Address (number, street, and apt. or suite no.)

Requester's name and address (optional)

City, state, and ZIP code

List account number(s) here (optional)

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. The TIN provided must match the name given on the "Name" line to avoid backup withholding. For individuals, this is your social security number (SSN). However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instructions on page 3. For other entities, it is your employer identification number (EIN). If you do not have a number, see *How to get a TIN* on page 3.

Note. If the account is in more than one name, see the chart on page 4 for guidelines on whose number to enter.

Social security number
☐☐☐ – ☐☐ – ☐☐☐☐

Employer identification number
☐☐ – ☐☐☐☐☐☐☐

Part II Certification

Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), and
2. I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, and
3. I am a U.S. citizen or other U.S. person (defined below), and
4. The FATCA code(s) entered on this form (if any) indicating that I am exempt from FATCA reporting is correct.

Certification instructions. You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply. For mortgage interest paid, acquisition or abandonment of secured property, cancellation of debt, contributions to an individual retirement arrangement (IRA), and generally, payments other than interest and dividends, you are not required to sign the certification, but you must provide your correct TIN. See the instructions on page 3.

Sign Here | **Signature of U.S. person ▶** | **Date ▶**

General Instructions

Section references are to the Internal Revenue Code unless otherwise noted.

Future developments. The IRS has created a page on IRS.gov for information about Form W-9, at *www.irs.gov/w9*. Information about any future developments affecting Form W-9 (such as legislation enacted after we release it) will be posted on that page.

Purpose of Form

A person who is required to file an information return with the IRS must obtain your correct taxpayer identification number (TIN) to report, for example, income paid to you, payments made to you in settlement of payment card and third party network transactions, real estate transactions, mortgage interest you paid, acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to provide your correct TIN to the person requesting it (the requester) and, when applicable, to:

1. Certify that the TIN you are giving is correct (or you are waiting for a number to be issued),
2. Certify that you are not subject to backup withholding, or
3. Claim exemption from backup withholding if you are a U.S. exempt payee. If applicable, you are also certifying that as a U.S. person, your allocable share of any partnership income from a U.S. trade or business is not subject to the withholding tax on foreign partners' share of effectively connected income, and
4. Certify that FATCA code(s) entered on this form (if any) indicating that you are exempt from the FATCA reporting, is correct.

Note. If you are a U.S. person and a requester gives you a form other than Form W-9 to request your TIN, you must use the requester's form if it is substantially similar to this Form W-9.

Definition of a U.S. person. For federal tax purposes, you are considered a U.S. person if you are:

- An individual who is a U.S. citizen or U.S. resident alien,
- A partnership, corporation, company, or association created or organized in the United States or under the laws of the United States,
- An estate (other than a foreign estate), or
- A domestic trust (as defined in Regulations section 301.7701-7).

Special rules for partnerships. Partnerships that conduct a trade or business in the United States are generally required to pay a withholding tax under section 1446 on any foreign partners' share of effectively connected taxable income from such business. Further, in certain cases where a Form W-9 has not been received, the rules under section 1446 require a partnership to presume that a partner is a foreign person, and pay the section 1446 withholding tax. Therefore, if you are a U.S. person that is a partner in a partnership conducting a trade or business in the United States, provide Form W-9 to the partnership to establish your U.S. status and avoid section 1446 withholding on your share of partnership income.

SECTION 01505
MOBILIZATION AND DEMOBILIZATION

PART 1 GENERAL

1.01 DEFINITION AND SCOPE

A. As required for the proper performance and completion of the Work, mobilization shall include, but not be limited to, the following principal items.

1. Move onto the site all Contractor's equipment required for the first month's operation.

2. Install silt fences around perimeter of project site and at locations where surface drainage discharges to existing stormwater inlets.

3. Install temporary construction power, wiring and lighting facilities.

4. Establish a fire protection plan and safety program.

5. Secure construction water supply.

6. Provide on-site sanitary facilities and potable water facilities.

7. Arrange for and erect Contractor's work and storage yard and employee's parking facilities.

8. Submit all required insurance certificates and bonds.

9. Obtain all required permits not previously obtained by the District.

10. Post all OSHA, FDEP, Department of Labor, and all other required notices.

11. Have Contractor's project manager and/or superintendent at the job site full time.

12. Submit a detailed progress schedule acceptable to the Engineer and District.

13. Submit a finalized Schedule of Values of the Work in the District's approved format.

14. Submit a hurricane preparedness plan acceptable to the Engineer and the District.

15. Submit standardized traffic maintenance and control plans using FDOT standards to the Engineer and the District.

16. Submit a detailed construction sequence plan for approval by the Engineer.

17. Erect all required Project signs.

1.02 PAYMENT FOR MOBILIZATION

A. The Contractor's attention is directed to the condition that no payment for mobilization, or any part thereof, will be approved for payment under the Agreement until all mobilization items listed above have been completed as specified.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01570
TRAFFIC REGULATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall be responsible for providing safe and expeditious movement of traffic through construction zone in accordance with all applicable laws and regulations. A construction zone is defined as the immediate areas of actual construction and all abutting areas which are used by the Contractor and which interfere with the driving, biking or walking public.

B. Perform all work within rights-of-way and easements in strict accordance with the FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION standards and other applicable statutory requirements to protect the public safety.

1.02 TRAFFIC CONTROL

A. The Contractor shall submit a Traffic Control Plan based on FDOT Design Standards and signed and sealed by a qualified, licensed Florida professional engineer for approval by the Engineer and District.

B. The Contractor shall immediately notify the District of any vehicular of pedestrian safety or efficiency problems incurred as a result of the construction of the project.

C. Until the permission to close the street is received in writing from the proper authority, all excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he/she shall repair the road surface, provide temporary ways, erect wheel guards or fences, or take other measures satisfactory to the District.

D. The Contractor shall take precautions to prevent injury to the public due to open trenches. Night watchmen may be required where special hazards exist, or police protection provided for traffic while work is in progress. The Contractor shall be fully responsible for damage or injuries whether or not police protection has been provided.

E. Notify the Fire Department, Police Department, EMS Department, and School Board before closing any street or portion thereof. No closing shall be made without the approval of the District or agency having jurisdiction. Notify said departments when the streets are again passable for emergency vehicles.

F. The Contractor shall leave his/her night emergency telephone number or numbers with the applicable law enforcement agency having jurisdiction, so that contact may be made easily at all times in case of barricade and flare trouble or other emergencies.

G. Maintain postal service facilities in accordance with the requirements of the U.S. Postal Service. Move mailboxes to temporary locations designated by the U.S. Postal Service or provide and maintain portable temporary mailbox clusters. Contractor shall notify affected residents if mailboxes are to be relocated and to where. At the completion of the work in each area, replace mailboxes in their original location and in a condition satisfactory to the U.S. Postal Service and

property owner and other service vehicles can identify each street or roadway so as not to delay their service. If temporary signs or markers are used, they shall meet the requirements of the District and the Manual of Uniform Traffic Control Devices. Any signs or markers removed or relocated in the course of construction shall be replaced in the location and in equal or better condition that existed prior to construction.

1.03 FAILURE TO COMPLY

A. Failure of the Contractor to comply with above or failure of the Contractor to make revisions, adjustments, or improvements directed by the District will constitute violation of the Agreement. Immediate shut down and restoration of the site to allow traffic access to area may result. The Contractor shall hold the District and the Engineer harmless from damages, loss of time, or expenses incurred, resulting from such shut down.

1.04 TRAFFIC CONTROL MEETINGS

A. The District and/or Engineer shall schedule and conduct meetings as required with the Contractor to attend to matters of traffic control and associated public convenience and safety during the course of the Work.

B. The Engineer shall preside at the meetings and provide for keeping the minutes and distribution of minutes to the District, the Engineer, the Contractor, and others. The purpose of the meetings will be for the Contractor presentation of traffic control plans and any revisions required during performance of the Work and to discuss related matters.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01580
PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall furnish, install, and maintain two project identification signs for the WORK.

B. Remove sign on completion of construction.

C. Allow no other signs to be displayed except for traffic control and safety.

1.02 PROJECT IDENTIFICATION SIGN

A. Two painted signs, of size of not less than 32 square feet area, with painted graphic content to include:

1. Title of Project

2. Name of District

3. Names and titles of authorities as directed by the District

4. Prime Contractor’s name and the name and telephone number of the Contractor’s contact person

B. Graphic design, style of lettering, and colors: As designated by Engineer.

C. Erect on the project site at a lighted location of high public visibility such as along the pipeline route or adjacent to the staging area. Final locations to be approved by the District or Engineer.

1.03 QUALITY ASSURANCE

A. Sign Painter: Professional experience in type of work required.

B. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.

1.04 SUBMITTALS

A. Submit shop drawings as specified in Section 01300.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Structure and Framing: Shall be new wood or metal, in sound condition structurally adequate to work and suitable for specified finish.

B. Sign Surfaces: Marine grade plywood with medium density overlay, standard large sizes to minimize joints.

C. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.

D. Rough Hardware: Galvanized bolts, nuts and washers. Nailing will not be permitted.

E. Paint: Exterior quality.

PART 3 EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

A. Paint exposed surfaces of supports, framing and surface material; one coat of primer and one coat of exterior paint.

B. Paint graphics in styles, sizes and colors selected.

3.02 MAINTENANCE

A. Maintain signs and supports in a neat, clean condition; repair damages to structure, framing or sign.

B. Relocate informational signs as required by progress of the work.

3.03 REMOVAL

A. Contractor shall remove signs, framing, supports and foundations at completion of WORK.

END OF SECTION

SECTION 01590
FIELD OFFICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall furnish, install and maintain temporary field offices or temporary field office space for the Contractor's use during the entire construction period as described herein; and shall furnish, install and maintain storage and work sheds needed for construction. At completion of the Work, the Contractor shall remove field offices, sheds and contents.

1.02 SUBMITTALS

A. Prior to the Pre-construction Conference, the Contractor shall submit to the Engineer a sketch of the temporary field offices and related facilities for consideration and approval of location.

1.03 REQUIREMENTS FOR FACILITIES

A. Construction shall:

1. Be structurally sound, weathertight, with floors raised above ground.

2. Have temperature transmission resistance: Compatible with occupancy and storage requirements.

3. At Contractor's option, portable or mobile buildings may be used.
   a. Mobile trailers or buildings, when used, shall be modified for office use.
   b. Mobile trailers or buildings shall not be used for living quarters.

B. Contractor's Office and Facilities:

1. Size: As required for general use.

2. Lighting: 50-foot candles at desktop height.

3. Automatic heating and mechanical cooling (air conditioning) equipment sufficient to maintain comfort conditions.

4. Telephone Lines:

   a. One direct line for telephone or 5G Wi-Fi Hot Spot

5. Racks and files for Project Record Documents.

6. One 10-inch outdoors type thermometer.

7. One outdoors rain gauge.

8. Xerographic machine with reduction, enlargement, and ten sets capabilities.

C. The Contractor shall make all provisions and pay all installations and other costs, including maintenance and supplies for the Contractor's field office in order to provide telephone, power service, exterior lights, xerographic machine and facsimile machine at the project site.

D. The Contractor shall provide a fully operational office for the Engineer's Resident Project Representative (RPR) within 30 days after insurance of the Effective Date of the Agreement. Requirements for RPR's Office in Contractor's field office:

1. Office Size: 10 foot by 12-foot minimum divided into an office and bathroom.
2. Ceiling height shall be 8-feet.
3. Two (2) exterior entry doors to have a keyed lockset keyed alike.
4. Lighting: 50-foot candles at desktop height.
5. Automatic heating and mechanical cooling (air conditioning) equipment sufficient to maintain comfort conditions.
6. One 5 foot by 2-1/2-foot desk with chair.
7. One 6 foot by 2-1/2-foot folding table with 2 chairs.
8. One 6-foot high by 3-foot wide metal storage cabinet with key.
9. Two 4-foot high by 3-foot wide bookcase.
10. One 4-drawer file cabinet.
11. Wireless high-speed internet connection.
12. Bathroom with flush toilet, sink and mirror. Bathroom door shall be equipped with a lock.
13. Each room shall be provided with two (2) duplex convenience electrical outlets.
14. Two wastebaskets.
15. One wall mounted first aid kit.
16. Two smoke detectors with batteries.
17. One dry erase board 36"x60", markers and eraser.
18. Cross-cut shredder with basket.
19. Fire extinguisher, UL rated, Class A complying with local codes.
20. Two 8-outlet surge protectors with 1800-joule energy rating.
21. Extension power cords for connection of equipment herein.

22. Hewlett Packard All-in-One color inkjet scan, fax, copier, printer with multi sheet scan and fax input, minimum 600 dpi B&W resolution, able to input and output letter and legal-size paper, or equal.

1.04 PARKING

A. The Contractor shall provide a temporary parking area at the field office if available.

B. The Contractor shall not allow vehicle parking by employees or subcontractors on public rights-of-way.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT AND FURNISHINGS

A. Materials, equipment and furnishings may be new or used, but must be in good condition, serviceable, adequate for the required purpose, and must comply with all applicable LAWS AND REGULATIONS.

PART 3 EXECUTION

3.01 PREPARATION

A. The Contractor shall fill and grade sites for temporary structures to provide adequate surface drainage.

3.02 INSTALLATION

A. The Contractor shall construct temporary field offices on proper foundations; provide connections for utility services; secure portable or mobile buildings when used; provide steps and landings at entrance doors; provide roofs over landings and entrance doors, and provide hurricane or high wind tie-downs embedded in subsurface concrete pilasters, thereby meeting or exceeding applicable LAWS AND REGULATIONS.

B. The Contractor shall mount a thermometer and rain gauge at convenient outside locations, not in direct sunlight.

3.03 MAINTENANCE AND CLEANING

A. The Contractor shall provide periodic maintenance and cleaning for temporary structures, furnishings, equipment and services at not less than one week intervals.

3.04 REMOVAL

A. The Contractor shall remove temporary field offices, contents and services at a time when no longer needed and as approved by the District.

B. The Contractor shall remove foundations and debris and grade site to required elevations and clean the areas.

3.05 LOCATION OF FIELD OFFICES

A. The Contractor is responsible for securing the location of the field office and any required agreements for the use of the location shall be between the Contractor and the location's owner. The Contractor shall provide a layout of all temporary field offices to the District for consideration and approval prior to the Pre-construction Conference.

END OF SECTION

SECTION 01600
DELIVERY, STORAGE AND HANDLING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section specifies the general requirements for the delivery handling, storage and protection for all items required in the construction of the work. Specific requirements, if any, are specified with the related item.

1.02 TRANSPORTATION AND DELIVERY

A. Transport and handle items in accordance with manufacturer's instructions.

B. Schedule delivery to reduce long term on-site storage prior to installation and/or operation. Under no circumstances will equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.

C. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.

D. Deliver products to the site in manufacturer's original sealed containers or other packing systems, complete with instructions for handling, storing, unpacking, protecting and installing.

E. All items delivered to the site will be unloaded and placed in a manner which will not hamper the Contractor's normal construction operation or those of subcontractors and other contractors and will not interfere with the flow of necessary traffic.

F. Provide necessary equipment and personnel to unload all items delivered to the site.

G. Promptly inspect shipment to assure that products comply with requirements, quantities are correct, and items are undamaged. For items furnished by the District, perform inspection in the presence of the Engineer/District. Notify Engineer verbally, and in writing, of any problems.

1.03 STORAGE AND PROTECTION

A. The Contractor will furnish a covered, weather-protected storage structure providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, ductile iron pipe gaskets, restrained joint materials, mechanical joint flanges, bolts, and any special equipment to be incorporated into this project. Manufacturer's storage instruction will be studied by the Contractor and reviewed with the Engineer by him. Instruction will be carefully followed and a written record of this kept by the Contractor. Arrange storage to permit access for inspection.

B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.

C. Cement and lime will be stored under a roof and off the ground and will be kept completely dry at all times. All structural, miscellaneous and reinforcing steel will be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams will be stored with the webs vertical. Precast

concrete will be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products will be handled and stored in a manner to reduce breakage, cracking and spalling to a minimum.

D. Keep pipe staging areas mowed and clear of debris.

1.04 PROTECTION AFTER INSTALLATION

A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.

B. Control traffic to prevent damage to equipment and surfaces.

C. Provide coverings to protect finished surfaces from damage.

D. Lawns and Landscaping.

1. Prohibit traffic of any kind across planted lawn and landscaped areas.

1.05 SPECIAL TOOLS

A. If required, manufacturers of equipment and machinery will furnish any special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use. The Contractor will preserve and deliver to the District with receipt, these tools and instructions in good order 10 days prior to facility startup.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01610
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. Material and equipment incorporated into the Work:

1. Conform to applicable specifications and standards.

2. Comply with size, make, type and quality specified, or as specifically approved in writing by the Engineer.

3. Manufactured and Fabricated Products
   a. Design, fabricate and assemble in accord with the best engineering and shop practices.
   b. Manufacture like parts of duplicate units to standard sizes and gages, to be interchangeable.
   c. Two or more items of the same kind will be identical, by the same manufacturer.
   d. Products will be suitable for service conditions.
   e. Equipment capacities, sizes and dimensions shown or specified will be adhered to unless variations are specifically approved in writing.

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.02 RELATED REQUIREMENTS

A. The Contract Documents include, but are not limited to, the following related requirements:

1. Conditions of the Contract

2. Summary of Work is included in Section 01010.

3. Special Project Procedures are included in Section 01100.

4. Submittals are included in Section 01300.

5. Cleaning is included in Section 01710.

6. Operating and Maintenance Data is included in Section 01730.

7. Warranties and Bonds are included in Section 01740.

1.03 APPROVAL OF MATERIALS

A. Only new materials and equipment will be incorporated in the work. All materials and equipment furnished by the Contractor will be subject to the inspection and approval of the Engineer. No material will be delivered to the work without prior approval of the Engineer.

B. Within 30 days after the Effective Date of the Agreement, the Contractor will submit to the Engineer, data relating to materials and equipment he/she proposes to furnish for the work.

Such data will be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the specifications. The data will comply with Section 01300.

C. Facilities and labor for handling and inspection of all materials and equipment will be furnished by the Contractor. If the Engineer requires, either prior to beginning or during the progress of the work, the Contractor will submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples will be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Contractor will make arrangements for and pay for the tests.

D. The Contractor will submit data and samples sufficiently early to permit consideration and approval before materials are necessary for incorporation in the work. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly will not be used as a basis of claim against the District or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes and surfaces, the Contractor will provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work will correspond to the approved samples or other data.

1.04 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. When Contract Documents require that installation of work will comply with manufacturer’s printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to the Engineer.

1. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer’s instructions, consult with Engineer for further instructions.

2. Do not proceed with work without clear instructions.

C. Perform work in accordance with manufacturer’s instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.05 TRANSPORTATION AND HANDLING

A. Arrange deliveries of Products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.

1. Deliver Products in undamaged condition, in manufacturer’s original containers or packaging, with identifying labels intact and legible.

2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that Products are properly protected and undamaged.

B. Provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

1.06 STORAGE AND PROTECTION

A. The Contractor will furnish a covered, weather-protected storage structure providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, and any special equipment to be incorporated into this project. Storage of equipment will be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including connection of heaters, placing of storage lubricants in equipment, etc. The Contractor will furnish a copy of the manufacturer's instructions for storage to the Engineer prior to storage of all equipment and materials. Corroded, damaged or deteriorated equipment and parts will be replaced before acceptance of the project. Equipment and materials not properly stored will not be included in a payment estimate.

B. Store Products in accordance with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weather tight enclosures.

2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

3. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.

4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.

C. All materials and equipment to be incorporated in the work will be handled and stored by the Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting and any injury, theft or damage of any kind whatsoever to the material or equipment.

D. Cement, sand and lime will be stored under a roof and off the ground and will be kept completely dry at all times. All structural and miscellaneous steel and reinforcing steel will be stored off the ground or otherwise to prevent accumulations of dirt or grease and in a position to prevent accumulations of standing water and to minimize rusting. Beams will be stored with the webs vertical. Precast concrete beams will be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking. Brick, block and similar masonry products will be handled and stored in a manner to reduce breakage, chipping, cracking and spalling to a minimum.

E. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified will be promptly removed from the site of the work and the Contractor will receive no compensation for the damaged material or its removal.

F. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored Products to assure that Products are maintained under specified conditions and free from damage or deterioration.

G. Protection After Installation

1. Provide substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations. Remove covering when no longer needed.

H. The Contractor will be responsible for all material, equipment and supplies sold and delivered to the District under this Contract until final inspection of the work and acceptance thereof by the District. In the event any such material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance, the Contractor will replace same without additional cost to the District.

I. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the District retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering and any other costs associated with making the necessary corrections.

1.07 WARRANTY

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in Section 01740.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01665
STARTUP

PART 1 GENERAL

1.01 GENERAL

A. Prior to requesting issuance of the Certificate of Substantial Completion, startup will be completed as specified herein.

B. All equipment shall be tested and approved in the presence of the District and Engineer prior to placing into operation.

PART 2 MATERIALS (NOT USED)

PART 3 EXECUTION

3.01 PRELIMINARY MATTERS

A. General Requirements:

1. Successfully execute the step-by-step procedure of startup and performance demonstration specified hereinafter.

2. The startup and performance demonstration shall be successfully executed prior to substantial completion and acceptance by the District.

3. Field acceptance tests shall be witnessed by the District and Engineer. At least 30 calendar days prior to scheduled testing, Contractor shall submit details of all test procedures to the Engineer for review.

4. All performance tests and inspections shall be scheduled at least 10 working days in advance or as otherwise specified with the District and Engineer. All performance tests and inspections shall be conducted during the normal work week of Monday through Friday, unless otherwise specified.

5. The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the District takes over the operation thereof.

B. Preparation for Startup:

1. Upon completion of each segment of the raw water main, the pipeline shall be filled with water and hydraulically checked for leaks, cracks, and defects.
   a. Prior to pipe filling, all debris or deleterious material shall be removed from the pipe if allowed to enter. Failure to maintain the pipe clean during installation may result in the Engineer ordering the Contractor to flush the line in question.
   b. Contractor shall be responsible for the cost of, and disposal of, water required for flushing.

2. All mechanical equipment shall be checked to ensure that it is in good working order and properly connected. All systems shall be purged as required.

3.02 FIELD TESTS

A. Field tests shall be made to confirm compliance with the CONTRACT and to establish compliance with the technical provision. The test shall be performed by the Contractor as herein specified. All piping, and equipment shall be tested in the field in the presence of the Engineer or his authorized assistant, and the District in the manner prescribed in the Sections of these Specifications pertaining to such installation. It is the Contractor's responsibility to coordinate with other contractors in the testing and acceptance of pipelines that cross contract boundaries.

B. Hydrostatic and Leakage Tests

1. Pressure and leakage test shall be performed in accordance with the applicable sections of the American Water Works Association Standard for Installation of Cast Iron/Ductile Iron Water Mains, AWWA C-600 and American Water Works Association Standard for Steel Pipes 6-inch and larger, AWWA C200, except as herein modified or as specified in Sections 02616, 02622 and 02623.

2. After completion of all work or any portion thereof and before final acceptance, a hydrostatic and leakage test shall be conducted. Water used in tests will be at the Contractor's expense. Where applicable, the Contractor shall coordinate the development of the water supply with the pipeline work in order that water will be available to meet these requirements. At no time are existing valves to be operated without the presence of a duly qualified representative of the District.

3. Hydrostatic tests of the completed pipelines shall be performed in accordance with the applicable piping specifications.

4. The test pipe connection, taps into the pipelines, and all necessary apparatus shall be furnished by the Contractor. In addition, the Contractor shall furnish the calibrated test gauge.

5. All exposed pipes, fittings, valves, and joints will be carefully examined during the test, and all joints showing a visible leakage shall be made tight. All defective pipe, fittings, valves, and accessories shall be removed from the line and replaced by the Contractor.

6. The Contractor may backfill the trench before he tests the line if he so desires, but he shall open up the trench at his own expense to repair the leaks.

7. A leakage test shall be conducted after the pressure test has been satisfactorily completed. The Contractor shall furnish the calibrated gauge for this leakage test. All visible leaks shall be corrected regardless of the total leakage as shown by the test. All lines which fail to meet these tests shall be repaired and retested as necessary, until test requirements are complied with. The duration of each leakage test shall be two hours.

8. The installation will not be accepted until the leakage is less than the number of gallons per hour as determined by the formula below:

$$L = \frac{SD(P)^{0.5}}{133{,}200}$$

in which "L" equals the allowable leakage, in gallons per hour; "S" is the length of the pipe tested, in feet; "D" is the nominal pipe diameter, in inches; and "P" is the average test pressure during the leakage test, in pounds per square inch gauge.

9. All tests shall be made in the presence of the Engineer and a representative of the District. No additional compensation will be paid to the Contractor for making the above tests; the cost of all labor, materials, lubricants, fuels, power, necessary appliances, and the coordination for testing purposes shall be included in the unit price or prices bid or the various items of work.

10. The Contractor shall give the Engineer and District 48 hours advance notice of the time when the installation is ready for hydrostatic and leakage tests.

3.03 INITIAL OPERATION TESTS

A. Upon completion of all structural, installation and adjustment of equipment, and pipe work, in a manner satisfactory to the Engineer and in compliance with the completion dates. The Contractor shall designate a way for initial testing of the facilities. Prior to such completion date, the Contractor shall give the District 10 days notice thereof in writing and the District will then appoint the personnel who will assist in the testing, and on the test day designated, the Contractor shall make the initial test to determine performance using the personnel designated by the District and such other personnel of his own as is specified or as he deems necessary to complete the tests. The field tests required will be as described in the applicable Sections of these Specifications.

B. The initial tests shall be limited to a period of 24 hours duration, or shorter if approved by the District/Engineer, and during this time the performance of all equipment shall be tested and demonstrated by the Contractor. If the demonstration and tests indicate satisfactory performance in the operation of the equipment, the Contractor will then be given a ten-day notice by the Engineer to make a final guaranteed test of the equipment under normal operation. During initial tests and the ten-day period between the initial tests and the final test, the Contractor's personnel shall supervise the operation of the equipment and assist and train the District's operating personnel in their duties. Experts on equipment installation and operation as specified or necessary as well as complete, written detailed erection, operation and maintenance instructions shall be furnished by the Contractor to insure proper training and instruction of the District's personnel.

C. All performance tests and inspections shall be conducted during the normal work week of Monday through Friday, unless otherwise specified.

D. The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the District takes over the operation thereof.

E. The final guarantee tests shall be conducted in accordance with procedures and shall be a prerequisite of substantial completion and acceptance, and shall be made at the conclusion of the ten-day period of operation and training. These tests shall be made under normal operating conditions under the supervision of the Contractor's personnel. This test is for the purpose of demonstrating that performance and efficiency guarantees of the equipment and other requirements in compliance with these Specifications have been met, that the operation of all

equipment is coordinated, and that all controls operate satisfactorily in accordance with the equipment installed.

F. In the event the initial or final guarantee testing and demonstration of equipment and controls does not meet the guarantee conditions or is not demonstrated to the satisfaction of the Engineer, the Contractor shall, at his own expense, make such changes and adjustments in the equipment which is deemed necessary and shall conduct further tests until full satisfaction is received thereof.

G. The District will pay the salaries of the personnel selected by the District for operation of the new booster station. Payment of all other salaries, public utility services, and operating expenses shall be borne by the Contractor for the test period and any additional test period required.

H. Startup with water and the final guarantee testing and demonstration shall not begin until all facilities and equipment have been tested as specified and ready for operation. The District must receive spare parts, safety equipment, tools and maintenance equipment, lubricants, approved operation and maintenance data, and the specified operation and maintenance instruction prior to the startup. All valve tagging as specified in Section 15100 shall also be completed prior to startup.

END OF SECTION

SECTION 01700
CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor will comply with requirements stated in the Contract Documents and in Specifications for administrative procedures in closing out the Work.

1.02 SUBSTANTIAL COMPLETION

A. When Contractor considers the Work is substantially complete as defined in Section 01010, he/she will submit to the Engineer:

1. A written notice that the Work, or designated portion thereof, is substantially complete.

2. A list of items to be completed or corrected.

B. Within 10 calendar days after receipt of such notice, the Engineer/District will make an inspection to determine the status of completion.

C. Should the Engineer determine that the Work is not substantially complete:

1. The Engineer will promptly notify the Contractor in writing, giving the reasons therefore.

2. Contractor will remedy the deficiencies in the Work, and send a second written notice of substantial completion to the Engineer.

3. The Engineer will reinspect the Work.

D. When the Engineer finds that the Work is substantially complete, he/she will:

1. Prepare and deliver to District a tentative Certificate of Substantial Completion on NSPE Form 1910-8-D, with a tentative list of items to be completed or corrected before final payment.

2. After consideration of any objections made by the District as provided in the Agreement, and when the Engineer considers the Work substantially complete, he/she will execute and deliver to the District and the Contractor a definite Certificate of Substantial Completion with a revised tentative list of items to be completed or corrected.

1.03 FINAL INSPECTION

A. When Contractor considers the Work is complete, he/she will submit written certification that:

1. Contract Documents have been reviewed.

2. Work has been inspected for compliance with Contract Documents.

3. Work has been completed in accordance with Contract Documents.

4. Equipment and systems have been tested in the presence of the District's representative and are operational.

5. Work is completed and ready for final inspection.

B. The Engineer will make an inspection to verify the status of completion with reasonable promptness after receipt of such certification.

C. Should the Engineer consider that the Work is incomplete or defective:

1. The Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.

2. Contractor will take immediate steps to remedy the stated deficiencies, and send a second written certification to the Engineer that the Work is complete.

3. The Engineer will reinspect the Work.

D. When the Engineer finds that the Work is acceptable under the Contract Documents, he/she will request the Contractor to make closeout submittals.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

A. Evidence of compliance with requirements of governing authorities.

B. Project Record Documents: Requirements of Section 01720.

C. Operating and Maintenance Data, Instructions to District's Personnel: Requirements of Section 01730.

D. Warranties: General Conditions and Section 01740.

E. Spare Parts and Maintenance Materials.

F. Evidence of Payment and Release of Liens: Requirements of General and Supplementary Conditions, on form entitled Contractor’s Final Affidavit provided in these documents.

G. Certificate of Insurance for Products and Completed Operations: Requirements of General Conditions.

H. Contractor’s Final Affidavit will be signed and submitted to the Engineer.

I. Executed warranty included in these documents.

1.05 FINAL ADJUSTMENT OF ACCOUNTS

A. Submit a final statement of accounting to the Engineer.

B. Statement will reflect all adjustments to the Contractor Sum:

1. The original Contract Sum.

2. Additions and deductions resulting from:
    a. Previous Change Orders.
    b. Unit Prices.
    c. Deductions for uncorrected Work.
    d. Deductions for liquidated damages.
    e. Other adjustments.
    f.
    g. Excessive shop drawing review cost by the Engineer.

3. Total Contract Sum, as adjusted.

4. Previous payments.

5. Sum remaining due.

C. The Engineer will prepare, for District approval, a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.06 FINAL APPLICATION FOR PAYMENT

A. The Contractor will submit the final Application for Payment in accordance with procedures and requirements stated in the Contract Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL

A. The Contractor will furnish all necessary tools and labor required to allow Engineer and District to verify the status of completion

END OF SECTION

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SECTION 01710
CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Execute cleaning, during progress of the work, and at completion of the work, as required by General Conditions.

1.02 RELATED WORK

A. Cleaning requirements included in Section 22 of the Agreement.

B. Each Section: Cleaning for specific products or work.

1.03 DISPOSAL AND CLEANING

A. Conduct cleaning and disposal operations to comply with codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

A. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

A. Employ skilled workmen for final cleaning.

B. Remove grease, mastic, adhesives, dust, dirt, stains, fingerprints, labels and other foreign materials from sight-exposed interior and exterior surfaces.

C. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.

D. Prior to final completion, conduct an inspection of sight-exposed interior and exterior surfaces and all work areas, to verify that the entire work is clean.

END OF SECTION

SECTION 01720
PROJECT RECORD DOCUMENTS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall maintain at the site for the District one record copy of:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other Modifications to the Contract.

5. District Supplemental Instructions or other written instructions.

6. Approved Shop Drawings, Working Drawings and Samples.

7. Field Test records.

8. Construction photographs.

9. Detailed Progress Schedule.

1.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Store documents and samples in Contractor's field office apart from documents used for construction.

1. Provide files and racks for storage of documents.

2. Provide locked cabinet or secure storage space for storage of samples.

B. File documents and samples in accordance with CSI format.

C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.

D. Make documents and samples available at all times for inspection by the Engineer/District.

E. As a prerequisite for monthly progress payments, the Contractor is to provide the currently updated "record documents" (Red Lines) for review by the Engineer and District.

1.03 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color code designated by the Engineer.

1.04 RECORDING

A. Label each document "PROJECT RECORD" with month and year in neat large printed letters.

B. Record information concurrently with construction progress.

1. Do not conceal any work until required information is recorded.

C. Drawings; Legibly mark to record actual construction:

1. Elevations of various structure elements in relation to grade (including tank slab elevation, top of tank, etc.).

2. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc.

3. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

4. Field changes of dimension and detail.

5. Changes made by District Supplemental Instruction or by Change Order.

6. Details not on original contract drawings.

7. Equipment and piping relocations.

D. Specifications and Addenda; provide one complete set and legibly mark each Section to record:

1. Manufacturer, trade name, catalog number, and Supplier of each Product and item of equipment actually installed.

2. Changes made by District Supplemental Instruction or by Change Order.

E. Shop Drawings (after final review):

1. One set of record drawings for each process equipment and piping system in conformance with Section 01300.

1.05 SUBMITTAL

A. Prior to final completion, deliver record drawings (and AutoCAD files, as required) of the Record Documents to the Engineer for the District. Also, include the Red Line markup and additional field notes suitable to confirm actual installed location of pipe.

B. Accompany submittal with transmittal letter in duplicate, containing: one set of specifications and Addenda, and Shop Drawings in accordance with Paragraph 1.04 D and E of this Section, prior to final completion.

C. Accompany submittal with transmittal letter in duplicate, containing:

1. Date.
2. Project title and number.
3. Contractor's name and address.
4. Title and number of each Record Document.
5. Signature of Contractor or his authorized representative.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 01730
OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. The Contractor shall compile product data and related information appropriate for District's maintenance and operation of products furnished under Contract.

1. Prepare operating and maintenance data as specified in this section and as referenced in other pertinent sections of the Specifications.

B. Instruct the District's personnel in maintenance of products and in operation of equipment and systems.

C. The Contractor shall submit the final documents after review and approval of the Engineer in electronic format as specified in Section 01300.

1.02 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:

1. Trained and experienced in maintenance and operation of described products.

2. Familiar with requirements of this section.

3. Skilled as technical writer to the extent required to communicate essential data.

4. Skilled as draftsman competent to prepare required drawings.

1.03 FORM OF SUBMITTALS

A. Prepare data in hardcopy and digital form of an instructional manual for use by District's personnel.

B. Format:

1. Size: 8-1/2 inches x 11 inches.

2. Paper: 20 pound minimum white, for typed pages.

3. Text: Manufacturer's printed data, or neatly typewritten.

4. Drawings:
   a. Provide reinforced punched binder tabs, bind in with text.
   b. Reduce larger drawings and fold to size of text pages but not larger than 14 in x 17 in.

5. Provide fly-leaf for each separate product or each piece of operating equipment.
   a. Provide typed description of product and major component parts of equipment.
   b. Provide indexed tabs.

6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS." List:
   a. Title of Project.
   b. Identity of separate structures as applicable.
   c. Identity of general subject matter covered in the manual.

7. Binders:
   a. Commercial quality three-post binders with durable and cleanable plastic covers.
   b. Maximum post width: Expandability 3 to 5 inches.
   c. When multiple binders are used, correlate the data into related consistent groupings.

C. Electronic Format

1. Electronic copy in portable document format (PDF) of all items listed in 1.03.B.

2. Provide on compact-disc (CD)-Rom, clearly labeled as indicated in 1.03.B.6.

1.04 CONTENT OF MANUAL

A. Neatly typewritten table of contents for each volume, arranged in systematic order.

1. Contractor, name of responsible principal, address and telephone number.

2. A list of each product required to be included, indexed to content of the volume.

3. List, with each product, name, address and telephone number of:
   a. Subcontractor or installer.
   b. Maintenance contractor, as appropriate.
   c. Identify area of responsibility of each.
   d. Local source of supply for parts and replacement.

4. Identify each product by product name and other identifying symbols as set forth in the Contract Documents.

B. Product Data:

1. Include only those sheets which are pertinent to the specific product.

2. Annotate each sheet to:
   a. Clearly identify specific product or part installed.
   b. Clearly identify data applicable to installation.
   c. Delete references to inapplicable information.

C. Drawings:

1. Supplement product data with drawings as necessary to clearly illustrate:
   a. Relations of component parts of equipment and systems.
   b. Control and flow diagrams.

2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.

3. Do not use Project Record Documents as maintenance drawings.

D. Written text, as required to supplement product data for the particular installation:

1. Organize in consistent format under separate headings for different procedures.

2. Provide logical sequence of instructions of each procedure.

E. Copy of each warranty, bond and service contract issued.

1. Provide information sheet for the District's personnel, give:
   a. Proper procedures in event of failure.
   b. Instances which might affect validity of warranties or bonds.

1.05 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit two hard copies and one electronic copy, in PDF format, of complete manual in final form.

B. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts.
   a. Function, normal operating characteristics, and limiting conditions.
   b. Performance curves, engineering data and tests.
   c. Complete nomenclature and commercial number of replaceable parts.

2. Operating procedures:
   a. Startup, break-in, routine and normal operating instructions.
   b. Regulation, control, stopping, shutdown and emergency instructions.
   c. Summer and winter operating instructions.
   d. Special operating instructions.

3. Maintenance procedures:
   a. Routine operations.
   b. Guide to "troubleshooting."
   c. Disassembly, repair and reassembly.
   d. Alignment, adjusting and checking.

4. Servicing and lubrication schedule:
   a. List of lubricants required.

5. Manufacturer's printed operating and maintenance instructions.

6. Description of sequence of operation by controls Manufacturer.

7. Original Manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

8. As-installed control diagrams by controls Manufacturer.

9. Each contractor's coordination drawings.
   a. As-installed color-coded piping diagrams.

10. Charts of valve tag numbers, with location and function of each valve.

11. List of original Manufacturer's spare parts, Manufacturer's current prices, and recommended quantities to be maintained in storage.

12. Other data as required under pertinent sections of the Specifications.

C. Prepare and include additional data when the need for such data as becomes apparent during instruction of District's personnel.

D. Additional requirements for operating and maintenance data: Respective sections of the Specifications.

E. Acceptance of the Operation and Maintenance (O&M) Manual will also require successful completion of the attached O&M review checklist.

1.06 SUBMITTAL SCHEDULE

A. Submit three copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within 60 days after Effective Date of the Agreement.

1. The Engineer will review the preliminary draft and return one copy with comments.

B. As specified in Section 01100, the Contractor shall submit operating and maintenance data within 60 days of shop drawing approval for each piece of equipment. No later than sixty days following the Engineer's approval of the last shop drawing for material to be included in the Operation and Maintenance Manuals, submit three bound volumes of all completed data for review. One copy will be returned with comments to be incorporated into final copies.

C. Submit specified number of copies of approved data in final form directly to the offices of the Engineer, CDM Smith Inc., within 30 calendar days of product shipment to the project site and preferably within thirty days after the reviewed copy is received. Final approved copies shall be delivered to the Engineer prior to District's personnel instruction, startup and acceptance by the District.

D. Submit two hard copies and one electronic copy, in PDF format, of addendum to the Operating and Maintenance Manual as applicable and certificates as specified in paragraph 1.03 of Section 01100 within 30 days after plant startup test and acceptance test.

1.07 INSTRUCTION OF DISTRICT PERSONNEL

A. Should the District request, the Contractor will provide operating and maintenance personnel in operation, adjustment, and maintenance of products, equipment, and systems. The operating and maintenance manuals shall constitute the basis of instruction.

B. The acceptance of the Manufacturer's training will be in accordance with the successful completion of the attached Manufacturer's Training Summary Report. This checklist will be completed by the District and Engineer at the completion of each vendor training session.

PART 2 PART2 - PRODUCTS (NOT USED)

PART 3 PART3 - EXECUTION (NOT USED)

O&M REVIEW CHECKLIST

GENERAL DATA

1. _____ Is the area representative's name, address, and phone number included?
2. _____ Is the nameplate data for each component included?
3. _____ Are all associated components related to the specific equipment included?
4. _____ Is non-pertinent data crossed out or deleted?
5. _____ Are drawings neatly folded and/or inserted into packets?

OPERATIONS AND MAINTENANCE DATA

6. _____ Is an overview description of the equipment and/or process included?
7. _____ Does the description include the practical theory of operation?
8. _____ Does each equipment component include specific details (design characteristics, operating parameters, control descriptions, and selector switch positions and functions)?
9. _____ Are alarm and shutdown conditions clearly identified?
10. _____ Are step procedures for starting, stopping, and troubleshooting the equipment included?
11. _____ Is a list of operational parameters to monitor and record for specific equipment included?
12. _____ Is a proposed operating log sheet included?
13. _____ Is a spare parts inventory list included for each component?
14. _____ Is a lubrication schedule for each component included - or does it clearly state "NO Lubrication Required"?
15. _____ Is a maintenance schedule for each component included?
16. Were both the District and Engineer satisfied with the Training Session?

O&M REVIEW CHECKLIST
(continued)

COMMENTS

Fully Approved: _____

The following points of rejection require resubmittal by the Contractor:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Reviewed By: _____

LEGEND

1 = Adequate
2 = Not Adequate
3 = Not Included

Note: This submittal has been reviewed for compliance with the Contract Specifications and Addendum.

MANUFACTURER'S TRAINING SUMMARY REPORT

Date: _____

Vendor: _____

Equipment: _____

Name of Representative: _____

1. Was representative prepared? _____

2. Was an overview description presented? _____

3. Were specific details presented for the system components? _____

4. Were alarm and shutdown conditions clearly presented? _____

5. Were step procedures for starting, stopping, and trouble shooting the respective system presented? _____

6. Were routine and preventive maintenance items clearly identified? This should include a lubrication schedule. _____

7. Did the representative present the information in a logical fashion?_____

8. Was the representative able to answer all questions? _____

9. Did the representative agree to research and answer unanswered questions? _____

10. Was the client (and CDM) satisfied with the training session? _____

Comments:

END OF SECTION

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SECTION 01740
WARRANTIES AND BONDS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including Manufacturer's standard warranties on products and special warranties.

1.02 RELATED REQUIREMENTS

A. The Contract Documents include, but are not limited to, the following related requirements:

1. Refer to Conditions of the Contract and Section 01100 for the general requirements relating to warranties and bonds.

2. General closeout requirements are included in Section 01700 Contract Closeout.

3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Divisions 02 through 16.

1.03 SUBMITTALS

A. Submit written warranties to the Engineer for review and transmittal to District prior to the date fixed for Substantial Completion. If the Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the District.

B. When a designated portion of the Work is completed and occupied or used by the District, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the District within fifteen days of completion of that designated portion of the Work.

C. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or Manufacturer, prepare a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the District for approval prior to final execution.

D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

1.04 WARRANTY REQUIREMENT

A. Related Damages and Losses: When correcting warranted Work that has failed, Contractor will remove 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, at no additional compensation.

B. 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 will be equal to the original warranty with an equitable adjustment for depreciation.

C. 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 District has benefited from use of the Work through a portion of its anticipated useful service life.

D. District's Recourse: Written warranties made to the District are in addition to implied warranties, and will not limit the duties, obligations, rights and remedies otherwise available under the law, nor will warranty periods be interpreted as limitations on time in which the District can enforce such other duties, obligations, rights, or remedies.

E. Rejection of Warranties: The District reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

F. The District 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 are willing to do so.

G. 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, Manufacturer’s, and subcontractors required to countersign special warranties with the Contractor.

H. If the District reasonably determines that the Contractor has breached any of the warranties provided herein, then the Contractor will perform the necessary work to comply with its warranties and will pay to the District its reasonable cost to investigate and then identify the breach of warranty claim.

1.05 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8 ½ -inches x 11-inches, punch sheets for standard three post binder.
   a. Sample form of warranty is included in these Contract Documents.
   b. Fold larger sheets to fit into binders.

2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS." List:
   a. Title of Project.
   b. Name of Contractor.

3. Electronic format as defined in Section 01300.

C. Binders: Commercial quality, three-post binder, with durable and cleanable plastic covers and maximum post width of 2-inches.

1.06 DEFINITIONS

A. Standard Product Warranties are preprinted written warranties published by individual manufacturers for particular products and are specifically endorsed by the manufacturer to the District.

B. Special Warranties are written warranties required by or incorporated in the Contract Documents, either to extend time limits provided by standard warranties or to provide greater rights for the District.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

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SECTION 02100
SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials and equipment required and perform all site preparation, complete as shown on the Drawings and as specified herein.

B. Obtain all permits required for site preparation work prior to proceeding with the work, including clearing and tree removal.

C. The areas to be cleared, grubbed and stripped within public rights-of-way and utility easements will be minimized to the extent possible. No unnecessary site preparation within these areas will be performed.

D. This Section also includes performance of a pre-construction survey of active and inactive gopher tortoise burrows, and capture and on-site relocation of gopher tortoises.

1.02 RELATED WORK

A. Refer to Florida Department of Transportation Standards for sodding requirements.

1.03 QUALIFICATIONS OF ENVIRONMENTAL SERVICES FIRMS

A. The firm performing pre-construction survey of active and inactive gopher tortoise burrows and on-site relocation of gopher tortoises shall include a biologist licensed by the State of Florida Fish and Wildlife Conservation Commission (FWC) as an authorized Gopher Tortoise Agent to perform capture and relocation of gopher tortoises. The Agent's FWC permit must include authorization to perform live capture and relocation.

1.04 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, copies of all permits required prior to clearing, grubbing, and stripping work.

B. Submit to the Engineer documentation demonstrating qualifications of biologist(s) employed by firm performing gopher tortoise survey, capture, and on-site relocation shall be submitted along with the firm's plan for performing the Work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING

A. Cut and remove all timber, trees, stumps, brush, shrubs, roots, grass, weeds, rubbish and any other objectionable material resting on or protruding through the surface of the ground.

B. Preserve and protect trees and other vegetation designated on the Drawings or directed by the Engineer to remain.

3.02 GRUBBING

A. Grub and remove all stumps, roots in excess of 1-1/2-in in diameter, matted roots, brush, timber, logs, concrete rubble and other debris encountered to a depth of 18-in below original grade or 18-in beneath the bottom of foundations, whichever is deeper.

B. Refill all grubbing holes and depressions excavated below the original ground surface with suitable materials and compact to a density conforming to the surrounding ground surface.

3.03 DISPOSAL

A. Small limbs may be mulched and left on site, however all tree trunks and large limbs shall be removed as described below.

B. Dispose of material and debris from site preparation operations by hauling such materials and debris to an approved offsite disposal area. No rubbish or debris of any kind will be buried on the site.

C. No on-site disposal of cleared and grubbed materials by open-air burning will be permitted by the District.

3.04 PROTECTION

A. Trees and other vegetation designated on the Drawings or directed by the Engineer to remain will be protected from damage by all construction operations by erecting suitable barriers, guards and enclosures, or by other approved means. Conduct clearing operations in a manner to prevent falling trees from damaging trees and vegetation designated to remain and to the work being constructed and so as to provide for the safety of workers and others.

B. Maintain protection until all work in the vicinity of the protected trees and vegetation has been completed.

C. Do not operate heavy equipment or stockpile materials within the branch spread of existing trees.

D. Immediately repair any damage to existing tree crowns, trunks, or root systems. Roots exposed and/or damaged during the work will immediately be cut off cleanly inside the exposed or damaged area. Treat cut surfaces with an acceptable tree wound paint and topsoil spread over the exposed root area.

E. When work is completed, remove all dead and downed trees. Live trees will be trimmed of all dead and diseased limbs and branches. All cuts will be cleanly made at their juncture with the trunk or preceding branch without injury to the trunk or remaining branches. Cuts over 1-in in diameter will be treated with an acceptable tree wound paint.

F. Restrict construction activities to those areas within the limits of construction designated on the Drawings, within public rights-of-way, and within easements provided by the District. Adjacent properties and improvements thereon, public or private, which become damaged by construction operations will be promptly restored to their original condition, to the full satisfaction of the property owner.

3.05 GOPHER TORTOISE SURVEY AND ON-SITE RELOCATION

A. The burrow survey, capture and on-site relocation activities shall be performed in accordance with procedures specified in the FWC's Gopher Tortoise Permitting Guidelines.

B. Bucket or live trap capture methods shall be used. Backhoe excavation of gopher tortoise burrows are not allowed.

END OF SECTION

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SECTION 02140
DEWATERING AND DRAINAGE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Design, furnish, install, operate, monitor, maintain and remove a temporary dewatering system as required to lower and control water levels at least two feet below trench and structure excavation subgrades, including launch/exit shafts, and one foot below trenchless casing invert to permit construction to proceed in-the-dry.

B. Furnish, operate, maintain and remove temporary surface water control measures to prevent surface water from entering excavations.

C. Retain the services of a professional engineer registered in the State of Florida to prepare dewatering and drainage system designs and submittals described herein.

D. Work shall include the design, equipment, materials, installation, protection, and monitoring of geotechnical instrumentation required to monitor the performance of the dewatering and drainage system as required herein.

E. Collect and properly dispose of all discharge water from the dewatering operations.

F. Obtain permits required for discharge of groundwater from dewatering operations.

G. Repair damage caused by dewatering and drainage system operations.

1.02 RELATED WORK

A. Submittals are included in Section 01300.

B. Site Preparation is included in Section 02100.

C. Jack and Bore is included in Section 02157.

D. Excavation, Bedding and Backfill for Pipe is included in Section 02221.

E. Excavation Support and Protection is included in Section 02311.

F. Geotechnical Instrumentation is included in Section 02495.

1.03 DESIGN REQUIREMENTS

A. The Contractor is responsible for the proper design and implementation of methods for controlling surface water and groundwater.

B. The primary purpose of the groundwater control system is to preserve the natural undisturbed condition of the subgrade soils in the areas of the proposed excavations. Prior to excavation, the Contractor shall lower the groundwater to at least 2-ft below pipe trench bottom and 2-ft below the lowest excavation subgrade elevation (including launch and exit shafts). The Contractor shall lower the groundwater to at least one foot below trenchless casing inverts. Additional

groundwater lowering may be necessary beyond the requirements above, depending on construction methods and equipment used and the prevailing groundwater and soil conditions. Dewatering shall be sufficient to control piezometric pressures to avoid any heave or destabilization of the excavation bottoms. The Contractor is responsible for lowering the groundwater as necessary to complete construction in accordance with the plans and specifications at no additional cost to the District.

C. Design deep wells, well points and sumps, and all other groundwater control system components to prevent loss of fines from surrounding soils. Sand filters shall be used with all dewatering installations unless screens are properly sized by the Contractor's design engineer to prevent passage of fines from surrounding soils.

D. The Contractor shall be responsible for damage to properties, buildings or structures, pipelines and other utility installations, pavements and work that may result from dewatering or surface water control operations.

E. Design review and field monitoring activities by the District or by the Engineer shall not relieve the Contractor of his/her responsibilities for the work.

1.04 SUBMITTALS

A. Dewatering and drainage system design plans shall be prepared and stamped by an experienced licensed professional engineer registered in the state of Florida and retained by the Contractor. The Contractor shall submit an original and three copies of the licensed professional engineer's certification on the PE form specified in Section 01300. The Contractor shall submit documentation of experience and qualifications as required herein.

B. The plan shall include a description of the proposed dewatering system and include the proposed installation methods to be used for dewatering and drainage system elements and for observation wells. The plan shall include equipment, drilling methods, holes sizes, filter sand placement techniques, sealing materials, development techniques, the number and location of dewatering points, observations wells and piezometers, etc. Include the dewatering system design calculations in the plan.

C. The plan shall identify the anticipated areas influenced by the dewatering system and address impacts to adjacent existing and proposed structures.

D. Coordinate dewatering and drainage submittals with the excavation and support of excavation submittals. The submittal shall show the areas and depths of excavation to be dewatered.

E. Do not proceed with any excavation or dewatering activities until the dewatering submittals have been reviewed by the Engineer for conformance with the Contract Documents and for general compatibility with the work and with accepted engineering practices.

1.05 QUALITY ASSURANCE

A. Regulations: Perform all work in accordance with current applicable regulations and codes of all Federal, State and local agencies.

B. The Contractor shall have at least 5 years of experience with dewatering system operations comparable to the dewatering operations required for the performance of the Work, employing labor and supervisory personnel who are similarly experienced in this type of Work.

C. The Contractor's dewatering and drainage system design engineer shall be licensed in the State of Florida and have a minimum of 5 years of professional experience in the design and construction of dewatering and drainage systems and shall have completed not less than 5 successful dewatering and drainage projects of equal type, size, and complexity to that required for the work.

1.06 DEFINITIONS

A. Where the phrase "in-the-dry" is used in this Section, it shall be defined as an excavation subgrade where the groundwater level has been lowered to at least 2-ft below excavation subgrade and 1-ft casing invert, is stable with no ponded water, mud, or muck, is able to support construction equipment without rutting or disturbance and is suitable for the placement and compaction of fill material, pipe or concrete foundations.

PART 2 PRODUCTS

2.01 MATERIALS

A. Observation wells and piezometers shall consist of minimum 2-in I.D, Schedule 40 PVC pipe and machine slotted PVC wellpoints, and maximum slot size 0.010-in.

B. Piping, pumping equipment and all other materials required to provide control of surface water and groundwater shall be suitable for the intended purpose.

C. Standby pumping systems and a source of standby power shall be maintained at all sites.

PART 3 EXECUTION

3.01 GENERAL

A. Control surface water and groundwater such that excavation to final grade is made in-the-dry, the natural undisturbed condition of the subgrade soils is maintained, and softening and/or instability or disturbance due to the presence or seepage of water does not occur. All construction and backfilling shall proceed in-the-dry and flotation of completed portions of work shall be prohibited.

B. Methods of groundwater control may include but are not limited to perimeter trenches and sump pumping, perimeter groundwater cutoff, well points, ejectors, deep wells and combinations thereof.

C. Where groundwater levels are above the proposed bottom of excavation level, a pumped dewatering system will be required for pre-drainage of the soils prior to excavation, and for maintaining the lowered groundwater level and controlling piezometric pressures, until construction has been completed to such an extent that the structure, pipeline or fill will not be floated or otherwise damaged.

D. It is expected that the type of system, spacing of dewatering units and other details of the work will have to be varied depending on soil/water conditions at a particular location.

E. All work included in this Section shall be done in a manner which will protect adjacent structures and utilities and shall not cause loss of ground or disturbance.

F. Install, monitor and report data from observation wells. Evaluate the collected data relative to groundwater control system performance and modify systems as necessary to dewater the site in accordance with the Contract requirements.

G. Locate groundwater control system components where they will not interfere with construction activities adjacent to the work area or interfere with the installation and monitoring of geotechnical instrumentation including observation wells. Excavations for sumps or drainage ditches shall not be made within or below 1H:1V slopes extending downward and out from the edges of existing or proposed foundation elements or from the downward vertical footprint of the pipe.

3.02 SURFACE WATER CONTROL

A. Construct surface water control measures, including dikes, ditches, sumps and other methods to prevent, as necessary, flow of surface water into excavations and to allow construction to proceed without delay.

3.03 EXCAVATION DEWATERING

A. At all times during construction, provide and maintain proper equipment and facilities to promptly remove and properly dispose of all water entering excavations. Excavations shall be maintained in-the-dry.

B. Excavation dewatering shall maintain the subgrade in a natural undisturbed condition and until the fill, structure or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.

C. Pipe, masonry, and concrete shall not be placed in water or be submerged within 24 hours after being installed. Water shall not flow over new masonry or concrete within four days after placement.

D. In no event shall water rise to cause unbalanced pressure on structures until the concrete or mortar has set at least 24 hours. Prevent flotation of the pipe by promptly placing backfill.

E. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed condition of the subgrade soils at the proposed bottom of excavation.

F. If the subgrade of the trench or excavation bottom becomes disturbed due to inadequate dewatering or drainage, excavate below normal grade as directed by the Engineer and refill with bedding rock or other material as approved by the Engineer at no additional cost to the District.

G. It is expected that the initial dewatering plan may have to be modified to suit the variable soil/water conditions to be encountered during construction. Dewater and excavate, at all times, in a manner which does not cause loss of ground or disturbance to the bearing soil or soil which supports overlying or adjacent structures or instability of the excavation.

H. If the method of dewatering does not properly dewater the excavation as specified, install additional groundwater observation wells as directed by the Engineer and do not place any pipe or structure until the readings obtained from the observation wells indicate that the groundwater has been lowered as specified within the excavation limits.

I. Dewatering units used in the work shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from the dewatering system shall be continuous until pipe or structure is adequately backfilled. Stand-by pumps shall be provided.

J. Existing or new sanitary sewers shall not be used to dispose of drainage.

3.04 WELL POINT SYSTEMS

A. Where necessary, install a vacuum wellpoint system or deep wells around the excavation to dewater the excavation. Each wellpoint and/or well and riser pipe shall be surrounded by a sand or gravel filter. Sand shall be of such a gradation that, after initial development of the wellpoints or wells, the quantity and size of soil particles discharged shall be negligible.

B. Wellpoint systems shall be capable of operating continuously under the highest possible vacuum.

C. Installation of wellpoint systems or wells shall be in accordance with the final reviewed submittal in the presence of the Engineer.

3.05 DEEP WELLS

A. Where necessary, install a deep well system around the excavation to dewater the excavation. Each well shall be surrounded by a sand or gravel filter with adequate gradation such that after development, the quantity and size of soil particles is negligible. Sufficient number of wells shall be installed to lower the groundwater level to allow excavation to proceed in-the-dry.

B. Installation of deep wells shall be in accordance with the approved submittal in the presence of the Engineer.

3.06 OBSERVATION WELLS

A. Install observation wells as required under this Section or in accordance with the approved submittal to monitor groundwater levels beneath and around the excavated areas until adjacent structures and pipelines are completed and backfilled.

B. Observation Well Locations and Depths:

1. Observation wells required shall be installed to a depth of at least five feet below the deepest level of excavation, unless otherwise approved by the Engineer, or to whatever depth is necessary to indicate that the groundwater control system designed by the Contractor’s engineer is performing as intended. Additional observation wells may be required by the Engineer if deemed necessary to monitor the performance of the Contractor’s groundwater control system.

2. Locations and depths of observation wells are subject to approval by the Engineer.

C. Protect the observation wells at ground surface by providing a lockable box or outer protective casing with lockable top and padlock. Design the surface protection to prevent damage by vandalism or construction operations and to prevent surface water from infiltrating.

1. Provide two copies of keys for each padlock to the Engineer for access to each well.

2. Observation wells shall be developed so as to provide a reliable indication of groundwater levels. Wells shall be re-developed if well clogging is observed, in the event of apparent erroneous readings, or as directed by the Engineer.

3. Submit observation well installation logs, top of casing elevation, and well locations to the Engineer within 24 hours of completion of well installation.

D. Observation Well Maintenance

1. The Contractor shall maintain each observation well until adjacent structures and pipelines are completed and backfilled. Clean out or replace any observation well which ceases to be operable before adjacent work is completed.

2. It is the Contractor's obligation to maintain observation wells and repair or replace them at no additional cost to the District, whether or not the observation wells are damaged by the Contractor's operations or by third parties.

E. Monitoring and Reporting of Observation Well Data

1. The Contractor shall begin monitoring of groundwater levels in work areas prior to initial operation of drainage and dewatering system. Daily monitoring in areas where groundwater control is in operation shall continue until the time that adjacent structures and pipelines are completed and backfilled and until the time that groundwater control systems are turned off.

2. The Contractor is responsible for processing and reporting observation well data to the Engineer on a daily basis. Data is to be provided to the Engineer on a form, which shall include the following information: observation well number, depth to groundwater, total depth to well, top of casing elevation, groundwater level elevation and date and time of reading.

3.07 REMOVAL OF SYSTEMS

A. At the completion of the excavation and backfilling work, and when approved by the Engineer, wellpoints, pumps, generators, other equipment and accessories used for the groundwater and surface water control systems shall be removed from the site. All materials and equipment shall become the property of the Contractor. All areas disturbed by the installation and removal of groundwater control systems and observation wells shall be restored to their original condition.

B. Leave in place any casings for deep wells, wellpoints or observation wells located within the zone below 1H:1V planes extending downward and out from the downward vertical footprint of the pipe, or where removal would otherwise result in ground movements causing adverse settlement to adjacent ground surface, utilities or existing structures.

C. Where casings are pulled, holes shall be filled with sand. Where left in place, casings should be filled with cement grout and cut off a minimum of 3-ft below finished ground level or 1-ft below foundation level so as not to interfere with finished structures or pipelines.

D. When directed by the Engineer, observation wells should be left in place for continued monitoring. When so directed, cut casings flush with final ground level and provide protective lockable boxes with locking devices. The protective boxes shall be suitable for the traffic and for any other conditions to which the observation wells will be exposed.

E. All deep wells, observation wells, and piezometers shall be properly installed and abandoned per SJRWMD requirements.

END OF SECTION

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SECTION 02157
JACK AND BORE UNDER ROADWAYS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, equipment, materials, and incidentals required and install pipe and casing pipe by jacking at the location shown on the Drawings. The work shall be done in strict accordance with the requirements of Clay County, and FDOT Utility Permit as shown on the Drawings and as specified herein. All work must be done in keeping with standards of the Florida Department of Transportation Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways, Roadway and Traffic Design Standards, Section 556 of Florida Department of Transportation Standard Specifications for Road and Bridge Construction (latest edition), AASHTO and by Clay County.

B. Prior to installing the casing, retain at Contractor's own expense the services of a qualified civil and/or geotechnical engineer licensed in the state of Florida. The aforementioned engineer shall, prior to submittal as required under Paragraph 1.03 below, approve and affix his/her stamp to the Contractor's drawings and design concept for the jacking. The drawings and design concept shall include but not be limited to the dewatering, soil stabilization, jacking pits, jacks, reaction blocks, excavation and support systems and installation schedule. The Contractor's engineer shall avail himself of all the available information contained on the contract drawings and herein and shall be responsible for making whatever additional investigations of the site and the conditions thereon that he/she may deem necessary. The Contractor's engineer shall be responsible for the inspection of the jack and bore for conformance to his/her drawings and design concepts.

C. Continuously keep the jacking pits' subgrade free from ground and surface waters during the operation and shall be prepared to implement additional groundwater control on short notice if directed by the Engineer. Observed water levels prior to construction are to be lowered to at least 2-ft below the invert elevation of the jacking pits. Dewatering will be necessary not only for the pits, but along the entire length of the casing and must be addressed in the submittal per paragraph 1.03, B. Groundwater control along and at the face of the jacking sleeve shall include chemical grout stabilization as required. Failure on the part of the Engineer to direct the implementation of additional dewatering efforts shall in no way relieve the Contractor from his responsibility to comply with all requirements of this specification.

D. Be fully responsible for inspecting the location where the pipes are to be installed and shall familiarize himself with the conditions under which the work will be performed and with all necessary details as to the orderly prospective of the work. The omission of any details for the satisfactory installation of the work in its entirety which may not appear herein, shall not relieve the Contractor of full responsibility.

E. Prepare to work at night and on Saturday and Sunday, if required to complete the work and upon receiving the approval granted by the District for any work to be performed outside of the approved project working hours. After the operation has begun, work continuously (24 hours a day) until the complete length of pipe has been installed. Standby pumping systems and a source of standby power shall be maintained at all times.

F. If any movement or settlement occurs which causes or might cause damage to existing structure over, along or adjacent to the work, immediately stop any or all work except that which assists in making the work secure and in preventing further movement, settlement or damage. Resume jacking only after all necessary precautions have been taken to prevent further movement, settlement or damage and shall repair the damage, at Contractor's own cost and to the satisfaction of the Engineer. Reference Section 02495 for instrumentation and monitoring requirements.

G. Conform with all requirements of the FDOT Right of Way Permit.

H. Follow all OSHA regulations regarding confined space for casing installation. Obtain all permits required associated with OSHA regulations and requirements for confined space entry.

I. No rescue shafts shall be allowed.

1.02 RELATED WORK

A. Excavation Support and Protection is included in Section 02311.

B. Dewatering and Drainage is included in Section 02140.

C. Geotechnical Instrumentation is included in Section 02495.

1.03 SUBMITTALS

A. Shop Drawings: Submit shop drawings and product data for materials to be used for jacking operations.

B. Design Calculations: Submit design calculations detailing equipment and construction methods to be used for jacking operations as specified herein and as shown on the contract drawings. The submittal shall specifically include the following and shall be signed and sealed by the Contractor’s engineer:

1. Control of groundwater and surface drainage.

2. Method of soil stabilization and/or groundwater control at the face.

3. Method of face excavation.

4. Method of excavation removal.

5. Maintenance of alignment and grade.

6. Materials and installation of casing pipe.

7. Grouting outside of casing pipe.

8. Grouting between casing pipe and carrier pipe.

9. Bulkheads.

10. Schedule.

11. Lubricant for decreased jacking friction and pumping system.

The design calculations are to be submitted for informational purposes.

C. Submit the Contractor's qualifications as described herein.

D. Submit the Contractor's Florida professional engineer's qualifications as described herein.

E. Daily surveyor reports of casing pipe position and control point monitoring, conducted by the Contractor's surveyor, shall be provided in writing to the Engineer.

F. Acceptance of the submitted material by Engineer does not indicate acceptance of responsibility for the means and methods of construction. Contractor shall be totally responsible for the entire jacking operation.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A53 - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless

2. ASTM C32 - Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)

3. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar

4. ASTM C150 - Standard Specification for Portland Cement

5. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes

B. American Water Works Association (AWWA)

1. AWWA C200 - Steel Water Pipe 6-in (150mm) and Larger

2. AWWA C203 - Coal-Tar Protective Coatings and Linings for Steel Water Pipelines - Enamel and Tape - Hot-Applied

3. AWWA C206 - Field Welding of Steel Water Pipe

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Regulations: Perform all work in accordance with current applicable regulations and codes of all Federal, State, and local agencies.

B. The Contractor shall have at least five 5 years' experience with compatible work to the Work shown and specified, employing labor and supervisory personnel who are similarly experienced in this type of work. Compatible work shall include jack and bore of at least 48-inch-diameter casing pipe at least 150 feet long below roadways.

C. The Contractor's engineer shall be a professional engineer, registered in the State of Florida, with 5-years demonstrated experience in the design and installation of jacking sleeves, pipes and appurtenances.

1.06 DEFINITIONS

A. Casing pipe shall mean the outer sleeve that is installed by jacking method.

B. Carrier Pipe shall mean the pipe inserted within the casing pipe and which acts as the conveyor for water.

C. Launch shaft shall mean the shaft in which the jacking equipment is installed and from which both the casing pipe and the carrier pipe are launched.

D. Exit shaft shall mean the shaft at the point where the carrier pipe emerges from the casing pipe.

PART 2 PRODUCTS

2.01 MATERIALS

A. The 48-inch O.D. steel casing pipe shall have a minimum yield strength of 35,000 psi, have a 0.5-in minimum wall thickness as shown on the Drawings and conform to AWWA C200 and ASTM A139. Steel sleeves shall be painted inside and outside with two coats bitumastic enamel coating paint in accordance with AWWA C203. The pipe shall be equipped with grout holes as specified herein. The casing pipe shall be designed to withstand applicable loading.

B. Steel pipe casing shall be furnished in lengths of the Contractor's choice. The casing shall have beveled ends with a single or double v-groove and shall be field joined by full-penetration butt welding all around prior to jacking. Alternatively, Permalok connectors may be used.

C. Steel pipe casing shall have 2-inch grout holes such that grout ports are provided at 4-foot-maximum intervals along the length of the completed crossings. The grout holes shall be spaced at 120 degrees on center (three holes at each interval) orientated with one hole at the crown. Two-inch steel half-couplings shall be welded over the holes in the pipe casing, and shall have threaded steel plugs.

D. Pipe shall be as shown on the Drawings and as specified in Division 2.

E. End seals may consist of brick bulkheads (minimum 8" thick) which shall be of sound, uniformly burned brick conforming to ASTM C32, Type C end seals with stainless steel bands as manufactured by Pipeline Seal and Insulator, Inc, or Cascade CCES casing end seals with stainless steel bands.

F. Mortar shall consist of 1 part cement, 1/4 part lime and 2 parts sand. Sand shall comply with ASTM C144; lime shall comply with ASTM C207, Type S; cement shall comply with ASTM C150, Type II.

G. The Contractor shall furnish and install 304 SS casing spacers on the carrier pipes as described below. The casing spacers shall be Cascade Model CCS3200-8 CTR or approved equal. Casing spacers shall be spaced a maximum of seven feet apart along the length of the carrier pipe with one casing spacer within three feet of each side of a pipe joint and the rest evenly spaced.

Spacers are to be installed within two feet of the end of casing pipe. Wood skids are not permitted. In cases where the casing and carrier pipe are installed in close proximity to facilities with stray current, such as gas lines, high voltage power transmission lines, etc., the spacers shall be provided with composite contacts to prevent transmitting the stray current to the carrier pipe.

H. Grout for pressure injection between the casing and the earth shall be a mixture of Portland cement and bentonite or similar commercial product that shall harden to a minimum compressive strength of 500 psi. The grout shall be readily pumpable. The shop drawings shall include both the proposed grout and the pumping system.

I. Cement grout used to fill the space between the casing and the carrier pipes shall consist of a mixture of about 1-part cement to 3 parts sand which shall be subject to increase or decrease in the amount of cement necessary, as determined by the Engineer, to provide good flowing characteristics. Cement grout shall have a minimum pH of 12 and shall be free of fly ash.

J. Lubricant for decreasing jacking friction between the jacked casing pipe and earth shall be bentonite slurry or similar commercial product.

PART 3 EXECUTION

3.01 LAUNCH AND EXIT SHAFTS

A. Refer to Section 02311 – Excavation Support and Protection for shaft requirements.

B. Trench boxes shall not be used as support of excavation for any launch or exit shafts.

3.02 JACKING OPERATIONS

A. Casing pipes near existing roads and utility easements where so shown shall be installed to the limits shown in accordance with the approved encroachment agreement or permit.

B. The Contractor shall provide all material, equipment, and facilities required for installing, positioning, and jacking the casing pipe.

C. The casing pipe at each location shown on the Drawings shall be jacked in one continuous 24-hour-per-day operation. In no event shall jacking or lubricant injection be discontinued for sufficient period to cause the partially jacked sleeve to "freeze" in place.

D. Proper alignment and elevation of the casing shall be consistently maintained throughout the jacking operation. Tolerances for installation of the casing pipes shall be as follows:

1. Vertical - plus or minus 0.50 feet.

2. Horizontal - plus or minus 0.50 feet.

E. Jacking shall not commence until the Contractor has installed, initialized, and is prepared to record readings from all geotechnical instrumentation as required by Section 02495 - Geotechnical Instrumentation.

F. The Contractor shall be fully responsible for minimizing the occurrence of voids outside the casing pipe. All voids shall be filled with cement grout.

G. Removal of material from the casing face shall be by hand-mining or augering. The jacking shield shall be of steel construction as described in Paragraph 2.01 with an open face shield and the appropriate configuration to allow for the installation of a breasting system. The breasting system should be removable and replaceable in the event that obstructions are encountered. An auger and cutting head may be utilized in lieu of hand-mining for soil removal during jack and bore. The auger and cutting head arrangement shall not extend past the leading edge of casing and a soil plug shall be maintained inside the casing at all times to reduce the potential for soil loss above the casing during jacking. The auger and cutting head shall be removable from the pipe in the event an obstruction is encountered.

H. The Contractor shall excavate only from within the shield/casing to minimize the volume of the voids outside the jacked casing pipe and shall constantly exercise care in the removal of the excavation.

I. Each new section of casing pipe shall be butt-welded to the section previously jacked into position.

J. Groundwater shall be controlled at all times. If groundwater is expected to be above or within the casing level, a groundwater control system consisting of vertical or horizontal wells or well points shall be installed and operated such that the groundwater level is lowered to at least the casing invert level at the face. Groundwater control along and at the face of the casing pipe shall include grout stabilization as required. Dewatering design and operations shall be in accordance with Section 02140 - Dewatering and Drainage.

K. The Contractor shall use a jacking ring consisting of either steel or concrete construction. This jacking ring will allow the jacking pressure to be distributed evenly around the wall of the casing pipe.

L. The Contractor shall also use a jacking frame. The frame shall be fabricated from structural steel members and shall be designed to distribute the stresses from the jacks evenly to the jacking ring.

M. The Contractor shall use thrust blocks adequately designed to carry the thrust of the jacks to the soil without excessive soil deflection and in such a manner as to avoid any disturbance of adjacent structures or utilities and to jack the casing reliably in the correct alignment. Refer to Section 02311 – Excavation Support and Protection for thrust block design requirements.

N. Jacking pressures used shall be uniformly distributed through the jacking frame and parallel to the axis of the pipe. Extreme care shall be taken so that crushing or other damage to the joints of the casing pipe will not occur.

O. The Contractor shall have a redundant lubricant injection system connected for immediate use in the event the primary system fails during the jacking operation. Lubricant injection shall be continuous until the casing is fully installed.

P. The alignment of the casing pipe shall be checked at least daily by the Contractor’s surveyor as the casing progresses and daily written reports provided to the Engineer. Adjustments shall be made immediately if any misalignment occurs.

Q. If work is stopped for any reason, the exposed face of the excavation shall be fully protected with a bulkhead satisfactory to the Engineer.

R. The carrier pipe shall not be direct jacked.

S. The carrier pipe shall not be installed until leakage into the casing pipe, after removal of all dewatering pumping systems, does not exceed 20 gallons per hour/100 linear feet of finished casing pipe.

T. The Contractor shall be responsible for damages resulting from subsidence, collapsed casings, or ground losses into the jacked pipe casing and for the refilling of voids resulting there from with grout. Where such ground losses are so severe that they result in damage to underground or surface pavement, existing utilities or structures, the Contractor shall be solely responsible for remedying such damage. Where the filling of voids cannot be effectively carried out from below, the Engineer reserves the right to order the Contractor, at no additional cost to the District, to make openings from the surface for the purpose of backfilling the voids. If in the judgment of the Engineer, a portion of the casing and/or pipe requires reinforcing because of such collapse, the Engineer may direct the Contractor to furnish and place such reinforcement at no additional cost to the District. Reinforcement may also be directed when the stability of the soil adjacent to the casing and/or pipe has been affected by the loss of ground.

U. The Contractor shall be responsible for all effects on road traffic resulting from such ground loss, including all costs and all coordination with and meeting traffic control requirements of FDOT and the required traffic control, permit acquisition, fees, fines, etc.

V. Maximum allowable deflection of the inside diameter of the casing in any direction from a true circle shall be 1.0 percent of the inside diameter. Deflection shall be measured at not more than 50-foot-intervals.

3.03 GROUTING

A. Immediately following the jacking operation, pressure grout the jacked section to fill all voids existing outside of the casing pipe. Grouting shall be performed from the interior of the casing pipe through grouting holes. Lubricant shall be displaced by the grout. Grouting shall be started in the lowest connections and shall proceed until grout begins to flow from upper connections. The void shall be completely filled. Displaced lubricant shall be disposed of off-site in accordance with applicable regulations and codes of all Federal, State, and local agencies.

B. If voids are encountered while installing encasement pipe 30 inches and larger, grout through grout holes in the top section of the casing pipe to fill the void spaces at sufficient pressure the prevent settlement of the roadway, unless FDOT approval stipulates otherwise. Other grout mixtures may be submitted for approval.

C. Grout pressure shall not exceed one-half of the existing overburden pressure.

D. Apparatus for mixing and placing grout shall be capable of mixing effectively and stirring the grout and then forcing it into the grout connections in a continuous uninterrupted flow.

E. After grouting is complete, pressure shall be maintained by means of stopcocks or other suitable devices until the grout has set sufficiently in the judgment of the Engineer, or for a minimum of 24 hours, whichever is longer. After the grout is set, grout holes shall be completely filled with dense concrete and finished neatly without evidence of voids or projections.

3.04 CARRIER PIPELINE INSTALLATION IN CASING AND FILLING OF ANNULAR SPACE

A. Casing spacers designed and certified by Cascade, or an approved equal, shall be capable of withstanding the forces to pull the pipe sections into the casing and to support the full weight of the pipe. The casing spacers shall prevent any movement or displacement of the pipe during grouting.

B. After the carrier pipe has been installed in the casing, shimmed, blocked, and tested, seal the ends of the casing around the pipeline with bulkheads and completely fill the space between the casing and the pipeline with cement grout or cellular concrete. Cement grout or concrete shall be pumped through 2-inch-minimum unjointed HDPE pipes extending through one bulkhead into the top of the casing at maximum 40-foot intervals. One pipe shall be located so as to be within 10 feet of the opposite bulkhead. This operation shall be performed in at least two stages to help prevent flotation. To ensure that the casing is completely full, two 2-inch-minimum unjointed HDPE pipes shall be installed near the crown of the casing from the midpoint of the casing to each end, and 2-inch openings shall be provided in each bulkhead at the tunnel crown location. Grout or concrete shall be pumped into the casing until it flows from the top of the casing in the HDPE pipe and bulkhead openings at both ends. Leave the HDPE pipe in place and cut off at the end of the casing.

END OF SECTION

SECTION 02213
ROCK AND BOULDER EXCAVATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required and perform excavation and disposal of rock and boulders in open cut trench excavation at no additional cost to the District.

B. Rock and boulder excavation shall mean the removal of rock in open cut trench excavation which, in the opinion of the Engineer, requires for its removal, wedging, sledging, cutting, or barring. Rock and boulder excavation shall be made in accordance with the "Typical Trench" detail for pipes and as shown on the Drawings or determined by the Engineer at no additional cost to the District.

C. Blasting will not be permitted.

1.02 RELATED REQUIREMENTS

A. The Contract Documents include, but are not limited to:

1. Excavation, Bedding, and Backfill for Pipe is included in Section 02221.

PART 2 PRODUCTS

2.01 MATERIALS

A. Gravel fill shall meet the specifications and gradation requirements for FDOT No. 89 stone from the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

PART 3 EXECUTION

3.01 DISPOSAL AND REPLACEMENT OF ROCK

A. Excavated rock and boulder material exceeding 6 inches in diameter shall not be used for backfilling unless otherwise approved. Rock of 3½ to 6 inches in diameter can be used in the fill material except for the following exceptions; maximum of 1½-inches within 12 inches of a pipeline and a maximum of 2 inches within 12 inches of a road subgrade or a structure. Rock and boulder material disposed by wasting shall be replaced by suitable excavation. Approved borrow to supply any deficiency of backfill shall be provided at no additional cost.

B. Excavated rock that meets the criteria for FDOT No. 89 stone may be processed and used for pipeline or structure bedding material, subject to the approval of the Engineer. Backfilling is further specified in Section 02221.

END OF SECTION

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SECTION 02221
EXCAVATION, BEDDING AND BACKFILL FOR PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all excavation (unclassified), backfill, fill, grading and slope protection required to complete the piping work shown on the Drawings and specified herein.

B. Excavation shall extend to the width and depth shown on the Drawings or as specified herein and shall provide suitable room for installing pipe, structures and appurtenances.

C. Furnish and place all sheeting, bracing and supports and remove from the excavation all materials which the Engineer may deem unsuitable for backfilling. The bottom of the excavation shall be firm, dry and in all respects, acceptable. If conditions warrant, deposit gravel for pipe bedding, or refill for excavation below grade, directly on the bottom of the trench immediately after excavation has reached the proper depth and before the bottom of the trench has become softened or disturbed by any cause whatever. The length of open trench shall be closely related to the rate of pipe laying. All excavation shall be made in open trenches.

D. All excavation and related sheeting, shoring, and bracing shall conform to the requirements of the Florida Trench Safety Act, (C5/5B 2626), which incorporates by reference, OSHA's excavation safety standards (29 CFR 1926.650 Subpart P).

1.02 RELATED WORK

A. Dewatering and Drainage is included in Section 02140.

B. Excavation Support and Protection is included in Section 02311.

1.03 SUBMITTALS

A. Submit, in accordance with Section 01300, complete product data for materials specified in this Section.

B. For each bedding and backfill material obtained from other than onsite sources, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50 pounds, at least seven calendar days prior to the date of anticipated use of such material.

C. Submit laboratory test results for all fill (offsite and onsite) materials (maximum density, gradation, Atterberg limits, sand equivalent, etc., as applicable) at least five days prior to importing or placing any fill.

1.04 DEFINITIONS

A. Percent Compaction is the required in-place dry density of the material, expressed as a percentage of the maximum dry density of the same material, as determined in the laboratory by AASHTO T-180 (Standard Proctor).

B. Optimum Moisture Content is the moisture content (percent by dry weight) corresponding to the maximum dry density of the same material as determined by AASHTO T-180 (Standard Proctor).

C. Moisture-Sensitive Soil is on-site soil containing more than 12 percent fines (silt- or clay-sized particles) based on the fraction passing the No. 200 sieve.

1.05 QUALITY ASSURANCE

A. Prior to and during the placement of backfill and fill, coordinate with the soils testing laboratory to perform in-place soil density tests to verify that the backfill/fill material has been compacted in accordance with the compaction requirements specified. The Engineer may designate areas to be tested.

PART 2 PRODUCTS

2.01 MATERIALS

A. Common Fill: Common Fill materials shall be soils having a group classification of SP, SP-SM, SP-SC, GM, or GC in accordance with the Unified Soil Classification per ASTM D2487. SM and SC may be used if they are effectively blended on-site with the cleaner sands to reduce the fines contents to no more than 20 percent passing the No. 200 sieve. Perform lab testing to verify fines content of blended soils. Particles larger than 2-inch in diameter shall not be allowed in these materials. These materials shall be free of roots, vegetative matter, topsoil, waste, construction materials, highly micaceous silt, frozen soil, marl, hardpan, or other objectionable material. Stone blocks, broken concrete, masonry rubble, or other similar materials shall not be allowed.

B. Select Common Fill: Select common fill materials shall be soils having a group classification of SP, SP-SM, SP-SC, GM, or GC in accordance with the Unified Soil Classification per ASTM D2487. SM and SC may be used if they are effectively blended on-site with the cleaner sands to reduce the fines contents to no more than 20 percent passing the No. 200 sieve. Perform lab testing to verify fines content of blended soils. Particles larger than 3/4-inch in diameter shall not be allowed in these materials. These materials should be free of roots, vegetative matter, topsoil, waste, construction materials, highly micaceous silt, frozen soil, marl, hardpan, or other objectionable material. Stone blocks, broken concrete, masonry rubble, or other similar materials shall not be allowed.

C. Unsuitable Materials: Unsuitable materials are soil, soil-aggregate and rock having a classification of MH, ML, CH, CL or PT, along with materials having an organic content exceeding 5.0 percent by weight. Soils with a plasticity index greater than 10%, or a liquid limit greater than 40% shall not be used.

D. Bedding Rock: Bedding rock shall be washed and graded crushed limestone or shell and conform to the gradation requirements of FDOT No. 89 stone.

PART 3 EXECUTION

3.01 GENERAL

A. All excavation, backfill and grading necessary to complete the work shall be made by the Contractor and the cost thereof shall be included in the contract price.

B. The Contractor shall take all the necessary precautions to maintain the work area in a safe and workable condition.

C. The Contractor shall protect the work area at all times by flagging, marking, lighting and barricading. It shall also be the Contractor's responsibility to preserve and protect all existing above and underground structures, pipelines, conduits, cables, drains or utilities. Failure of the Drawings to show the existence of these obstructions shall not relieve the Contractor from this responsibility. The cost of repair of any damage which occurs to these obstructions during or as a result of construction shall be borne by the Contractor without additional cost to the District.

3.02 EXCAVATION

A. Excavations for the installation of structures, pipes, and electrical ducts shall be made to the depths indicated on the Drawings. Normal grade for excavation of pipes shall be 6-inches below the invert of the pipe. The minimum trench width shall extend 24 inches beyond the outside diameter of the pipe as indicated on the Drawings and shall be sufficient for installing structures, pipes, or ducts, for bracing and supporting and for pumping and drainage facilities.

B. The bottom of the excavations shall be firm and dry and in all respects acceptable to the Engineer. Excavate unsuitable soil material from the bottom of the trench to a depth determined by the Engineer and replace with rock bedding.

C. Where pipe or ducts are to be laid in bedding rock, the trench may be excavated by machinery to, or just below, the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.

D. Where the pipes or ducts are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to the trench bottom by machinery. The last of the material being excavated shall be done manually in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly and uniformly supported along its entire length. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barrel only.

E. All rocks, roots, and organic muck, clay, or silt lenses removed in the preparation of the excavation for common fill shall be disposed of off-site by the Contractor as excess excavation. Soils which cannot qualify as common fill after preparation, such as muck soil, high organic soil, or non-granular soil high in silt and clay content shall also be disposed of off-site by the Contractor as excess excavation.

F. Failure of the Contractor to prepare excavated material to qualify as backfill shall not relieve the Contractor from his obligation to furnish common fill for backfill, regardless of the circumstances. The Engineer shall be the sole judge of whether excavation will qualify as

backfill after proper preparation and whether or not such preparation performed by the Contractor is satisfactory. Should the Contractor's preparation not be satisfactory, the Contractor shall use imported fill for backfill at no additional cost to the District.

G. No more than 100 linear feet of trench shall be open in advance of the pipe laying unless prior approval is given by the Engineer after consideration of ground conditions and/or location by the Engineer.

3.03 DISPOSAL OF MATERIALS

A. Excavated material shall be stacked without excessive surcharge on the trench bank or obstructing free access to hydrants and gate valves. Inconvenience to traffic and abutters shall be avoided as much as possible. Excavated material shall be segregated for use in backfilling as specified below.

B. Excess excavation, excavation which is unsuitable for common fill or select fill backfill, and all removed extraneous materials as identified herein shall be disposed of offsite by the Contractor.

C. The balance of the stockpiled excess material shall be disposed of offsite by the Contractor at a permitted site.

D. The Contractor shall locate and make all arrangements for disposal of excess and unsuitable materials. All handling, hauling, and disposal costs shall be included in the bid price. Stockpile areas shall be prepared and seeded. Disposal shall be in compliance with all applicable regulations.

E. Excess excavation which meets the requirements of common fill shall be stockpiled in a common readily accessible area, graded and/or covered for rain runoff, and used as a source of imported material until all the needs for imported material are identified, at which time the balance of the stockpiled excess material shall be disposed.

3.04 SHEETING AND BRACING

A. Sheeting and bracing shall be installed as specified in Section 02311.

3.05 STAGE 1 BEDDING

A. Pressure pipes shall be bedded using bedding rock by the following procedures:

1. Beginning at the bottom of the trench, bedding rock shall be placed and compacted to springline of the pipe, from the centerline of the pipe to the trench wall. Lift thickness shall not exceed 6 inches. Each lift shall be compacted using at least two passes with a vibratory plate compactor.

B. Above Stage 1, fill shall be placed and compacted as described below under "Backfilling."

C. Where stone bedding is used, an impermeable groundwater barrier at 100-foot intervals along the trench shall be used. The impermeable groundwater barrier shall consist of a 10 mil sheet of polyethylene covering the full cross sectional area of the gravel, embedded 6 inches into the trench sides and bottom, and extending to the top of the bedding rock. The barrier shall be offset a minimum of 2 feet from any culvert or pipe joint. Ends and splice points shall be lapped a minimum of 12 inches.

3.06 STAGE 2 BACKFILLING

A. Where pipes are located under paved roadways, driveways, sidewalks, or FDOT rights-of-way, the trench above the Stage 1 bedding, as described above, shall be backfilled and thoroughly compacted with select common fill from the springline to 12 inches above the pipe crown. Select common soil shall be placed and compacted in layers not to exceed 6-inches to 98 percent maximum density per AASHTO T-180. Moisture content of the soil shall be within minus 3 percent to plus 2 percent of the optimum. Above 12-inches over the crown of pipe, the backfill shall consist of Flowable Fill – Excavatable Design with a Maximum of 28-day compressive strength of 100 psi (full depth) per FDOT Standard Specifications and as shown on the Drawings.

B. Where pipes are not located under roadways, driveways, sidewalks, or FDOT rights-of-way, the trench above the Stage 1 bedding, as described above, shall be backfilled and thoroughly compacted with select common fill from the springline of the pipe to a height of 12 inches above the crown of the pipe. Compact select common soil in layers not to exceed 6-inches to 98 percent maximum density per AASHTO T-180. Remainder of trench may be backfilled with select common fill or common fill in layers not to exceed 12-inches to 95 percent maximum density per AASHTO T-180. Moisture content of the soil shall be within minus 3 percent to plus 2 percent of the optimum.

3.07 MARKING TAPE

A. Where pipes are not located under roadways, driveways, or sidewalks, a polyethylene double safe detectable marking tape shall be installed continuously in the backfill along the entire length of all PVC water mains for identification and detection purposes. For pipe sizes smaller than 12 inches, a single 4-inch-wide stripe along the top of the pipe shall be provided.

B. The tape shall be as manufactured by Thor Enterprises or equal. The polyethylene tape shall meet the requirements of ASTM D 1248, Type I, Class A, Grade E 1 for polyethylene plastics molding and extrusion materials. The tape shall have a minimum tensile strength of 1750 psi, a minimum elongation of 250 percent, not less than 50 gauge solid aluminum core and a nominal thickness of 5 mils. The tape shall be composed of 2 mil clear film reverse printed laminated to aluminum, foil laminated to 2 mil clear film and reverse printed. Minimum total thickness 4 mils.

C. The warning tape shall be printed on one side in black letters (typical for all lettering) and shall be fade resistant olive-green color as follows:

CAUTION: BURIED RAW WATER MAIN BELOW

Minimum marking tape widths shall be as follows:

Pipe Inside Diameter, Inches	Minimum Tape Width, Inches	No. of Tape Strips
12 and Less	4	1
14-20	4	2
24 & Larger	4	3

D. The Contractor shall submit typical samples of the printed marking tape to the Engineer for approval prior to installation (minimum length to show repeat of message).

E. The marking tape shall be placed in the trench backfill directly above and centered over the pipeline. The marking tape shall be installed between 12 and 18 inches above the top of the pipe. The Contractor shall exercise care to prevent damage to the polyethylene tape when placing the remaining backfill.

F. Where the pipeline passes through a manhole, vault or other underground structure, the polyethylene marking tape shall be placed on top of that portion of the pipeline, located inside the structure and shall be secured to the pipeline with adhesive tape.

G. Openings for air valves and similar appurtenances shall be provided by making an X shaped cut in the polyethylene and temporarily folding back the film. After the polyethylene is installed over the appurtenance, the slack shall be taped securely to the appurtenance and the cut in the polyethylene shall be repaired with adhesive tape.

3.08 RESTORING TRENCH SURFACE

A. Where the trench occurs adjacent to paved street, in shoulders or sidewalks, the Contractor shall thoroughly consolidate the backfill and shall maintain the surface as the work progresses. If settlement takes place, he shall immediately deposit additional fill to restore the level of the ground.

B. The surface of any driveway or any other area which is disturbed by the trench excavation and which are not a part of the paved highway shall be restored by the Contractor to a condition at least equal to that existing before work began.

C. In Sections where the pipelines pass through grassed areas, the Contractor shall, at his own expense, remove and replace the soil, or shall loam and sod the surface to the satisfaction of the Engineer. The depth of loam replaced shall be at least equal to that removed by the Contractor in his trenching operations, but in no event, shall it be placed less than 4-inches in depth. Sod disturbed in front of existing developed lots shall be replaced to match the existing sod.

END OF SECTION

SECTION 02223
EXCAVATION BELOW NORMAL GRADE AND
BEDDING ROCK REFILL

PART 1 GENERAL

1.01 SCOPE OF WORK

A. If in the opinion of the Engineer, the material at or below the normal grade of the bottom of a trench or excavation is unsuitable for pipe or structure foundation, it shall be removed to the depth determined by the Engineer and replaced by bedding stone as applicable.

B. Bedding rock used for pipe bedding is not included in the scope of work under this Section (see Section 02221).

1.02 RELATED REQUIREMENTS

A. The Contract Documents include, but are not limited to, the following related requirements:

1. Section 02140: Dewatering and Drainage

2. Section 02221: Excavation, Bedding, and Backfill for Pipe

PART 2 PRODUCTS

2.01 MATERIALS

A. Bedding rock shall be as specified in Section 02221.

PART 3 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. Whatever the nature of unstable material encountered or the groundwater conditions, trench dewatering shall be complete and effective as specified in Section 02140.

B. If the material at the level of trench bottom is unsuitable, as determined by the Engineer, it shall be removed to the extent determined by the Engineer and the excavation refilled with bedding stone.

C. If the Contractor excavates below normal grade of the trench bottom through error or for his/her own convenience, or through failure to properly dewater the trench, or disturbs the subgrade before dewatering is sufficiently complete, excavation below grade and furnishing and placing the refill material shall be performed at no additional cost to the District

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SECTION 02311
EXCAVATION SUPPORT AND PROTECTION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The work specified in this Section includes requirements for excavation and support of temporary excavations, launch and exit shafts, and trenches. The Contractor shall design, furnish, install, and maintain a system of supports, including all bracing and associated items, to retain excavations in a safe manner and to control ground movements Upon completion of the required construction, the system of support shall be removed or cut and left in place as noted herein and the excavation and staging area sites restored as discussed herein.

B. The work specified in this Section also includes the use of portable trench boxes or sliding shields.

C. The work shall include site grading; fencing and signing; construction staging areas; design and construction of excavation support systems; design and construction of thrust blocks; disposal of excavated material, surface water, and ground water; backfilling; and site restoration. Work shall include all labor, materials, and equipment required to complete excavation support.

D. The Contractor shall retain the services of a Professional Engineer licensed in, and in good standing with, the State of Florida to prepare excavation support and protection system designs and submittals described herein.

E. All excavations and support systems shall conform to the Florida Trench Safety Act and to applicable OSHA excavation, trenching, and shoring standards which are contained in the U.S. Code of Federal Regulations 29 (C.F.R.) 1926.650-1926.653, other federal, state or local requirements. In the event of a conflict, comply with the more restrictive applicable requirements.

F. Excavation support at trenchless crossings shall not impede the flow of traffic along the roadway being crossed.

G. The Contractor shall be responsible for choosing and sizing the support of excavation systems. The size of the systems shall, however, be adequate for removal of material as indicated on the Drawings and to provide adequate space to meet the Contractor’s work requirements for his/her selected methods of construction. The excavation support system shall be chosen such that it controls groundwater, limits the amount of ground movements and protects the adjacent structures.

1.02 RELATED WORK

A. Submittals is included in Section 01300,

B. Site Preparation is included in Section 02100.

C. Dewatering and Drainage is included in Section 02140.

D. Jack and Bore is included in Section 02157.

E. Excavation, Bedding and Backfill for Pipe is including in Section 02221.

F. Geotechnical Instrumentation is included in Section 02495.

1.03 DESIGN REQUIREMENTS

A. The design of the temporary excavation support system is the responsibility of the Contractor. The design calculations and drawings shall be prepared, stamped and signed by a Professional Engineer licensed in the State of Florida, who is experienced in designing similar excavation support systems.

B. Design the sheeting excavation support system in accordance with requirements of this Section. These criteria are the minimum acceptable standards. Design shall consider all phases of construction and design of each member or support element to support the maximum loads that can occur during construction with appropriate factors of safety.

C. Design shall consider all phases of construction. Design each member or support element to support the maximum loads that can occur during construction with appropriate factors of safety.

D. All underground utility lines shall be identified, located, and protected from damage or displacement. Utility companies and other responsible authorities shall be contacted to locate and mark the locations and, if they so desire, direct or assist with protecting the underground installation. When required, the Contractor shall obtain an excavation permit from the local authority having jurisdiction prior to the initiation of any excavation work.

E. Design excavation support systems in accordance with all OSHA requirements and other local and agency requirements.

F. Design the support system to minimize horizontal and vertical movements and to protect adjacent structures and utilities from damage.

G. Excavations below the level of the base of any adjacent foundation or retaining wall shall not be permitted unless the design of the excavation and bracing includes an analysis of the stability of the structure supported by the foundation and as necessary, incorporates required bracing/underpinning of the foundation.

H. For support systems in which bracing is installed between opposite sides of the excavation, design the excavation support of both sides to be nearly the same as feasible.

I. Where necessary to resist point loads, pipe piles used as soldier piles shall be filled with concrete with a compressive strength not less than 3,000 psi. The strength of the concrete shall not be considered in design of the pipe pile for bending stress.

J. Design a working slab for each launch shaft bottom to provide stable support for guide rails, thrust block, and other construction operations.

K. Design, install, operate, and maintain ground water control system to control ground water inflows, prevent piping or loss of ground, and maintain stability of the excavation. Refer to the requirements of Section 02140.

L. Thrust blocks shall be designed to resist the maximum jacking load at each launch shaft. The jacking load shall be estimated and thrust block designed based on a minimum friction resistance on the steel casing of 250 psf. A minimum jacking load of 200 tons shall be used. The thrust block shall be designed using a maximum passive earth pressure coefficient of 3.25, and a minimum factor of safety of 1.2. The maximum jacking load shall be incorporated into the launch shaft design.

M. Design, install, operate, and maintain deformation monitoring points to monitor the performance of the excavation support system in accordance with Section 02495.

N. Provide temporary fencing around all excavations. Provide pedestrian and traffic control around working areas and support systems located within or adjacent to streets, roadways, driveways, walkways or parking lots.

O. Receipt of the Contractor's plans and methods of construction by the Engineer does not relieve the Contractor of his responsibility to provide an adequate support system achieving the specified requirements.

P. Design review and field monitoring activities by the District or by the Engineer shall not relieve the Contractor of his/her responsibilities for the work.

1.04 SUBMITTALS

A. Submit to the Engineer in accordance with Section 01300, Shop Drawings and design calculations for the Contractor-designed excavation support system stamped by a Professional Engineer in the State of Florida. Submittals shall indicate the following, as a minimum:

1. Provide overall plan layout of the system, as shown on contract drawings, indicating clearances, dimensions, material properties, member sizes, locations, spacing and penetration depths of all members, as well as locations of various types of lateral supports. Indicate existing and proposed utilities, structures or other obstruction. Indicate location and type of instrumentation and monitoring points within the area of influence of the excavation.

2. Provide wall elevations and locations of all bracing and anchors.

3. Show methods and overall sequence of installation and removal of bracing, indicating levels to which the work will be carried out before bracing is installed or removed.

4. Method of preloading bracing (if required) and the preload for each member, and the method of locking-off the preload. Include detailed drawings of the connections, jacking supports and method of shimming.

5. Details, layout, arrangement, equipment requirements, and method of construction of the proposed steel sheeting excavation support system.

6. Submit thrust block design calculations and shop drawings for all jack and bore launch shafts.

7. Submit design calculations and shop drawings for the launch and exit shafts detailing material types, equipment, and construction methods to be used for construction of the excavation support systems prepared by a professional engineer registered in the state of

Florida as shown on the Contract Drawings. Shop drawings shall also detail all member connections and tunnel portal openings.

8. Procedures for resolving difficulties arising from misalignment of members exposed during excavation, and criteria for implementing those procedures.

B. Design calculations shall include:

1. Loads on the excavation support system for all stages of excavation, bracing removal, and concrete placement, including material and equipment loads on adjacent ground during construction.

2. Design of wall and all bracing members including all details for all stages of construction. Design shall account for water pressures associated with flood conditions.

3. Theoretical deflections of excavation support system and deformation of structures, pipelines and other utilities located within the area of influence of the excavation.

C. Submit quality control measures as required to ensure that the performance of the excavation support system is consistent with the requirements herein.

D. For portable trench boxes or sliding shields, submittals shall include the following as a minimum:

1. Trench box manufacturer's specifications, recommendations, and limitations.

2. Detailed drawings showing intended use of trench box during excavation, pipe placement, and backfilling activities.

E. Submit welder qualifications and weld procedures in accordance with AWS D1.1.

F. Submit Contractor's and Design Engineer's qualifications as described herein.

G. At least one copy of the design shall be maintained at the job site during excavation that includes a plan indicating the sizes, types, and configurations of the materials to be used in the protective system, and the identity of the registered engineer who approved the design.

H. Do not proceed with any support of excavation or protection activities until the submittal has been reviewed by the Engineer for compliance with the Contract Documents and for general compatibility with the work and with accepted engineering practices.

I. Contractor's Design Engineer's documentation shall include:

1. Periodic on-site inspections of excavation support system as the systems are constructed.

2. Review of quality control measures and performance data.

3. Certification that the excavation support system is constructed per the applicable design following completion of each support system and following any modifications by Contractor during construction.

1.05 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. ASTM A36 - Specification for Structural Steel Standard Specifications

B. American Welding Society (AWS)

1. AWS D1.1 for Public Works Construction

C. Codes

1. U.S. Occupational Safety and Health Administration (OSHA) Regulations, 29 CFR Part 1926 Subpart P – Excavations.

D. Where reference is made to one of the above standards the revision in effect at the time of the bid opening shall apply.

1.06 QUALITY ASSURANCE

A. Regulations: Perform all work in accordance with current applicable regulations and codes of all Federal, State and local agencies.

B. The Contractor shall have at least five years of experience with work comparable to the Work shown and specified, employing labor and supervisory personnel who are similarly experienced in this type of Work.

C. The Contractor's Design Engineer shall be a Licensed Professional Engineer in the State of Florida with at least five years professional experience in the design and construction of support of excavation systems and shall have completed not less than 5 successful excavation support projects of equal type, size, and complexity to that required for the work.

D. Design of thrust blocks shall be performed by a professional engineer, licensed in the State of Florida, with at least five years' experience in this type of work.

PART 2 PRODUCTS

2.01 MATERIALS

A. All timber, structural steel, and steel sheet piling used for the supporting systems, whether new or used, shall be sound and free from defects that may impair their strength.

B. Soldier piles and structural steel members shall conform to ASTM A572 or ASTM A242 unless approved otherwise. All steel conforming to ASTM A 572 shall be Grade 36 or better. No members with permanent deformations are to be provided. Members shall not be spliced unless approved by the Engineer.

C. Pipe piles used as soldier piles shall conform to ASTM A252, Grade 36, or better.

D. Steel sheet piling shall conform to ASTM A328 or ASTM A572 or ASTM A690. All steel sheet piling conforming to ASTM A 572 shall be Grade 50 or better.

E. Concrete shall conform to ASTM C33 and ASTM C150 unless otherwise approved.

F. All timber shall be structural grade with a minimum allowable flexural strength of 1100 psi. Timber lagging shall be at least 3 inches thick and free of large or loose knots.

PART 3 EXECUTION

3.01 GENERAL

A. Commence installation of support system and excavations only after shop drawings have been reviewed by the Engineer for conformance with the contract documents and for general compatibility with the work and with accepted engineering practices.

B. All instrumentation required per Section 02495 shall be installed and initialized prior to the start of work.

C. Methods of construction for excavations shall be such as to ensure the safety of the Work, Contractor's employees, Engineer, and District's employees and inspectors, the public and adjacent property and improvements, whether public or private.

D. Before beginning construction at any location of this project, adequately protect existing structures, utilities, trees, shrubs, and other existing facilities. The repair of or compensation for damage to existing facilities shall be at no additional cost to the District.

E. As a minimum, place fencing, gates, lights, and signs as necessary around the excavations and staging areas to provide for public safety.

F. Install excavation support systems in accordance with the approved shop drawings and applicable permits. Upon completion, the installed excavation support system shall be inspected by the Contractor’s Design Engineer with written certification provided to the Engineer.

G. Care shall be taken to prevent voids outside the excavation support system, but if voids are formed, they shall be immediately filled with common fill material. Voids in locations that cannot be properly compacted upon backfilling shall be filled with lean concrete or other material as approved by the Engineer at no additional cost to the District.

H. If unstable material is encountered during excavation, all necessary measures shall be taken immediately to contain it in place and prevent ground displacement.

I. If settlement or deflections of supports indicate that support system requires modification to prevent excessive movements, redesign and resubmit revised shop drawings and calculations to the Engineer at no additional cost to the District.

J. Sufficient quantity of material shall be maintained on site for protection of work and for use in case of accident or emergency.

K. All welding shall conform to the applicable provisions of ANSI/AWS D1.1.

3.02 PORTABLE TRENCH BOXES

A. Portable trench boxes or sliding trench shields may be used for the protection of workers only.

B. Trench boxes shall not be used in launch or exit shafts for trenchless work.

C. Additional excavation, backfilling, and surface restoration required as the result of trench box use shall be at no additional cost to the District.

D. Trench boxes or shields shall be designed, constructed, and maintained to meet acceptable engineering and industry standards.

E. Shields shall be installed in a manner to restrict lateral or other hazardous movement of the shield in the event of the application of sudden lateral loads.

F. A copy of the trench box manufacturer's specifications, recommendations, and limitations shall be in written form and maintained at the job site during all excavation work.

3.03 SOLDIER PILES AND LAGGING

A. Install soldier piles with the minimum embedment depths as shown on approved shop drawings.

B. Soldier piles shall be installed in predrilled holes with casing or other methods of support as necessary to prevent caving of holes and loss of ground.

C. Predrilled holes for soldier piles shall be backfilled with concrete from the pile tip elevation to the elevation of the bottom of the excavation. The remainder of the predrilled hole shall be backfilled with lean concrete or sand. Concrete strength shall be in accordance with the approved shop drawings.

D. The predrilled hole diameter shall be sufficient to allow for proper alignment and concrete backfilling of the pile.

E. Provide timber lagging of sufficient thickness to withstand earth pressures and in accordance with the approved shop drawings.

F. Install lagging such that ground loss does not occur between adjacent or below the lowest board. As excavation proceeds, the maximum height of unlagged face of excavation shall not exceed 4 feet. The unlagged face shall not exceed 2-ft if water seeps or flows from the face of the excavation or if the face of the excavation becomes unstable.

G. As installation progresses, backfill the voids between the excavation face and the lagging. Pack with materials such as hay, burlap, or geotextile filter fabric where necessary to allow drainage of ground water without loss of ground.

3.04 STEEL SHEET PILING

A. Install steel sheet piling with the minimum embedment depths as shown on the shop drawings.

B. Drive sheeting in plumb position with each sheet pile interlocked with adjoining piles for its entire length so as to form a continuous diaphragm throughout the length of each run of wall, bearing tightly against original ground. Exercise care in driving so that interlocking members can be extracted without damaging adjacent structures or utilities. The methods of driving, cutting, and splicing shall conform to the shop drawings.

C. Use templates or other temporary alignment facilities to maintain piling line.

D. Prior to installation, the sheet piles shall be thoroughly cleaned and inspected for defects and for proper interlock dimensions. The Contractor shall provide a tool for checking the interlock dimensions.

E. Each sheet pile shall have sufficient clearance in the interlocks to slide, under its own weight, into the interlock of the sheet pile previously placed.

F. Excavation shall not be carried in advance of steel sheet piling installation.

G. Where obstructions are anticipated, pre-excavation or pre-drilling along the sheet pile wall alignment shall be conducted at no additional cost to the District. Pre-excavation and pre-drilling shall not extend below the lowest excavation level or into bearing soils for existing or future structures.

H. Obstructions encountered before the specified embedment for piles shall be removed. Where obstructions cannot be removed, the sheet pile system shall be re-evaluated by the Contractor's Design Engineer for the resulted reduced embedment and additional toe stability measure implemented, as required or for realignment of the sheet pile wall. A submittal of the proposed measures shall be provided.

I. Damaged piling or piling with faulty alignment shall be withdrawn and new piling driven properly in its place. The cost of such additional work shall be considered as part of the pile driving and shall be borne by the Contractor.

3.05 INTERNAL BRACING

A. Provide internal bracing to carry maximum design load without distortion or buckling.

B. Include web stiffeners, plates, or angles as needed to prevent rotation, crippling, or buckling of connections and points of bearing between structural steel members. Allow for eccentricities caused by field fabrication and assembly.

C. Install and maintain all bracing support members in tight contact with each other and with the surface being supported. Wood shims shall not be used.

D. Coordinate excavation work with installation of bracing. Excavation shall extend no more than 2 feet below any brace level prior to installation of the bracing.

E. Use procedures that produce uniform loading of bracing member without eccentricities or overstressing and distortion of members of system.

3.06 REMOVAL OF EXCAVATION SUPPORT

A. Do not remove internal bracing and transfer loads to the permanent structure without prior acceptance of the Engineer.

B. Removal of excavation support system shall begin at, and progress from, the bottom of the excavation. Members shall be released slowly as to note any indication of possible failure of the remaining members or possible cave-in of the sides of the excavation.

C. Backfilling shall progress together with the removal of support systems from excavations.

D. Do not remove vertical support members that were installed within the zone of influence of new or existing structures or pipelines. The zone of influence is defined as a zone extending down and away from the outer edge of the structure at 1 horizontal to 1 vertical or from the centerline of the pipe. Support members installed within this zone shall be cut off at a minimum of 5 ft below finished grade and abandoned in place.

E. Unless otherwise indicated or directed by the Engineer, remove all portions of excavation support.

F. No wood shall remain as part of the abandoned portion of the work.

G. When removing the exaction support system, do not disturb or damage adjacent buildings, structures or utilities. Fill voids immediately with lean concrete or well-graded cohesionless sand, as indicated or directed by the Engineer.

H. Remove material of the excavation support system from the site immediately.

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SECTION 02413
HORIZONTAL DIRECTIONAL DRILLING

PART 1 GENERAL

1.01 SUMMARY

A. Furnish all labor, equipment, and materials necessary to install pipelines by horizontal directional drilling (HDD) at the locations shown on the Contract Documents.

B. The Work of this section includes all labor, machinery, construction equipment and appliances required to perform in a good workmanlike manner all directional boring and reuse/force main installation as shown on the Contract Documents.

C. The directional boring scope shall include, but not be limited to, steerable directional boring equipment, operator control cabin, mud plant, entry and exit pits, pumps, hoses, and other equipment, sheeting, location signs as required, equipment for containment of drilling fluids, and miscellaneous appurtenances to complete the entire Work as shown on the Contract Drawings. Directional boring operations shall be performed within the right-of-way and/or easements shown on the Contract Drawings and/or the areas described in Specification Section 01014. All work must conform to all local, state and federal regulations and wetland and surface water permits.

D. The Engineer has relied upon a geotechnical investigation report for general information purposes only and the report is not part of the Contract Documents. The Contractor shall examine the site and or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The District and Engineer will not assume responsibility for variations of subsurface conditions at locations other than places shown and at the time the investigation was made. Be cautioned of the potential for inadvertent returns, depending on the water table depth at the time of drilling and the potential for loss of circulation during drilling operations.

E. Refer to Specification Section 01014 for allowable Contractor work hours.

1.02 RELATED WORK

A. HDPE pipe and fittings is included in Section 02623.

B. Site Preparation is included in Section 02100.

C. Construction Constraints is included in Section 01014.

D. Geotechnical Instrumentation is included in Section 02495.

1.03 DEFINITIONS

A. Annular Space: The space between the excavated HDD final reamed bore diameter and the product pipe or cable.

B. Bent Sub: A section of drill pipe behind the cutting tools that is inclined at an angle at one to three degrees from the axis of the bore in the desired direction of steering. The bent sub allows steering while rotating the cutting tools.

C. Break-Away Connection: A connection to the product pipe that will fail at a pull force less than the rated stresses that are acceptable for the product pipe.

D. Drilling Fluid/Mud: A mixture of water, bentonite, and/or polymers continuously pumped to the drilling tools to facilitate the removal of soil cuttings, and stabilization of the bore. These fluids also cool the cutting tools and lubricate the drill pipe and product pipe string.

E. Drill String: The total length of the drill pipe in the borehole.

F. Drilling Tool/Bit: Any tool or system of tools which excavates at the face of a bore.

G. Entry Pit: The location where the pilot bore initially penetrates the ground surface and where the HDD rig is positioned.

H. Exit pit: The location where the pilot bore exits the ground surface.

I. Horizontal Directional Drilling: A surface-launched, guided, steerable drilling system used for the trenchless installation of pipes, conduits, and cables. A pilot bore path is excavated in a shallow arc from a surface-launched drill rig. Excavation takes place with fluid assisted cutting from a drilling tool on the drill string. The pilot bore is directed by the positioning of a bent sub. Tracking of the drill string is achieved by using a downhole wireline survey tool which shall be augmented by using a downhole gyroscope (a Global Positioning System (GPS) using a Gyro Steering Tool) or a walk over locator system at the surface. The bore is filled with drilling fluid/mud for stabilization, to cool the cutting tools, and to mix the cuttings into a slurry, which is circulated to the entry point where solids are removed before the drilling fluids are returned to the bore. The bore path is enlarged with subsequent reaming passes until the desired diameter is achieved. The product pipe, conduit, or cable is then pulled into the fluid-stabilized bore hole.

J. HDD Work Plan: Written descriptions, together with sketches, profile drawings, schedules, and other documents defining Contractor's plans and procedures for horizontal directional drilling. This HDD Work Plan also includes a detailed inadvertent return and subsidence analysis and any changes proposed to the boring lengths, depths, entry/exit pit locations or angles.

K. Inadvertent Return – Uncontrolled flow of drilling fluid/mud to the surface at a location other than the entry or exit pit. In certain conditions, this may also be known as hydrofracture or frac-out.

L. Obstruction: Any hard object lying completely or partially within the design pathway of the bore and pipe that prevents further advancement of the drill pipe, pre-reamer, reamer, and/or pipe, after all reasonable Contractor attempts to advance past the object or re-drill around the object have failed.

M. Pilot Bore: The action of creating the first guided pass of the HDD process which is then reamed in one or more passes to the size required to allow pullback of the pipe.

N. Pullback: The part of a horizontal directional drilling process in which the drill pipe, swivel, and product pipe or cable is pulled back through the bore to the entry.

O. Pullback Loads: The loads (forces) applied to a drill string and product pipe during the pullback process which also include tensile pullback loads, bending, buckling and combination loads.

P. Reamer: A cutting tool pushed or pulled through the borehole in order to enlarge the pilot bore hole to a diameter sufficient for the installation of the product pipe.

Q. Tracer Wire: Wire used to track the drill string, achieved by using a downhole wireline survey tool. A downhole gyroscope (a Global Positioning System (GPS) using a Gyro Steering Tool) or walk over locator system at the surface augments the tracer wire. Also, the wire bundled on carrier pipe during pullback for future location of pipe.

R. Settlement Point: A point with elevation and spatial location established by survey prior to construction. The point is re-surveyed periodically to monitor ground movements. The point may be a nail, pin, subsurface settlement rod, borehole extensometer, or other device that can be readily located and surveyed.

S. Work Plan: Written description, together with sketches, drawings, schedule and other documents defining Contractor's plans and procedures for HDD.

1.04 REFERENCE SPECIFICATIONS, CODES AND STANDARDS

A. API Bulletin 13D, 1985. Bulletin on the Rheology of Oil-Well Drilling Fluids, Second Edition, Dallas, Texas, American Petroleum Institute.

B. API Recommended Practice 13B-1, 1990. Standard Procedures for Field Testing Water-Based Drilling Fluids, First Edition, Dallas, Texas, American Petroleum Institute.

C. API Specifications 13A, 1993. Specification for Drilling Fluid Materials, Fifteenth Edition, Dallas, Texas. American Petroleum Institute.

D. ASTM F1962 – 11 or Latest Edition Use of Maxi-Horizontal Directional Drilling for Placement of Polyethylene Pipe or Conduit Under Obstacles, Including River Crossings.

E. Horizontal Directional Drilling Good Practices Guidelines, Latest Edition, HDD Industry Consortium, 300pp.

F. IADC Drilling Manual, 1992. Eleventh Edition, Houston, Texas, International Associated of Drilling Contractors.

G. Installation of Pipelines Beneath Levees Using Horizontal Directional Drilling, US Army Corps of Engineers, Waterways Experiment Station, Final Report, CPAR-GL-98-1, April 1998.

H. Installation of Pipelines by Horizontal Directional Drilling, Pipeline Research Committee, American Gas Association, PR-227-9424, April 1995.

I. Pipeline Design for Installation by Horizontal Directional Drilling, ASCE Manuals and reports on Engineering Practice No. 108, 2005.

J. Tables for Hydraulic Design of Pipes and Sewers, American Society for Civil Engineers, 5th ed., 1990.

1.05 SUBMITTALS

A. Following is the summary of information to be included in shop drawing submittals required for the HDD Work. Submittals as indicated in the following paragraphs shall be signed and sealed by a licensed Professional Engineer registered in the State of Florida. The Contractor may combine submittals at his discretion but at a minimum the following information shall be addressed and provided for review.

1. Qualifications
2. Schedule
3. Safety Plan
4. Methods, Equipment, and Materials Description Plan
5. Surveying Equipment and Procedures
6. Protection of Adjacent Structures and Facilities Plan
7. Contingency Plan for Remediation of Potential Problems
8. Disposal of Spoils and Drilling Fluids Plan
9. Equipment Layout Plan
10. Inadvertent Return and Surface Spill Contingency Plan
11. Horizontal Directional Drilling Work Plan
12. Soil Separation Plan
13. Maximum Allowable Drilling Fluid Pressure Calculations
14. Pipe Filling Methods and Testing
15. Pipe Stress Calculations
16. Pullback Calculations
17. Radius of Curvature Confirmation
18. Rig Capacity Plan
19. Contact Grouting Plan
20. Daily logs and records
21. As-built pilot bore profile
22. Risk Mitigation Meetings

23. Certified Work Zone Traffic Control Plan

B. In addition to other requirements indicated throughout this Specification, the following sections describe the above required submittals in more detail. Submittals shall be in accordance with the requirements of the Specifications, providing sufficient detail to allow the Engineer to judge whether or not the proposed equipment, materials, and procedures will meet the Contract requirements. The Engineer's review of submittal details and data will be based on considerations for the completed Work, utilities, and the possibility of necessary delays in the execution of the Work to be constructed under this Contract. Review and acceptance of the submittals by the Engineer shall not be construed in any way as relieving the Contractor of his responsibilities under this Contract.

1. Submit all Shop Drawings to the Engineer. Unless otherwise noted, all Shop Drawings shall have been reviewed and accepted by the Engineer prior to Contractor's mobilization. All Drawings shall be legible with dimensions accurately shown and clearly marked in English.

C. Qualifications: Submit written documentation of HDD superintendent and key personnel experience in accordance with Paragraph 1.07A and 1.07B.

D. Schedule: At least 15 working days prior to mobilization for HDD operations, submit a detailed schedule for the HDD installation showing all major construction activities and durations, with beginning and completion dates shown. The schedule shall be updated at least every week or more frequently, as directed by the Engineer, and shall include:

1. "One call" utility locate requests and visual confirmation of all crossing utilities and all parallel utilities within the vicinity of the bore centerline.

2. Risk Mitigation Meetings (see paragraph 1.05, W for additional requirements).

3. Rig mobilization and setup.

4. Pilot bore drilling.

5. Pre-reaming and reaming.

6. Layout and thermal butt-fusing of pipe.

7. Pressure testing of pipe prior to pullback.

8. Final reaming and pullback of pipe.

9. Pressure testing of pipe after installation.

10. Pig test.

11. Cleanup, surface restoration, and demobilization.

E. Safety Plan: Submit a Safety Plan, including the name of the Contractor's Site Safety Representative, emergency telephone numbers for medical facilities, and precautions for handling and disposal of any hazardous or flammable materials. The Safety Plan shall include a

code of safe practices and an emergency plan in accordance with OSHA and Florida/OSHA requirements

F. Methods, Equipment, and Materials Description Plan: Submit detailed description of methods, equipment, and materials to be used for the pipeline installation. Descriptions of drilling fluid additives shall be accompanied by Materials Safety Data Sheets (MSDS) and Manufacturers' descriptions and warranties. Descriptions of equipment shall include Manufacturers' specifications, calibrations, appropriate drawing, photographs, and descriptions of any modifications since manufacture. This plan shall also include the Contractor's means for complying with all local noise ordinances.

G. Surveying Equipment and Procedures: Submit records of equipment calibrations and certifications for all equipment used for downhole surveys and tracking of the drill head. Procedures for operating the downhole survey tools shall be described, including measures to verify the accuracy of the equipment readings. Procedures for layout of wire grid system shall be described and layout of the wire grid system shall be provided on a drawing or sketch. The layout shall be specific to this project and not a manufacturer's general schematic.

H. Protection of Adjacent Structures and Facilities Plan: Submit a plan that provides details on measures to be taken to monitor and protect adjacent utilities, structures, roadways and sidewalks, and provide details on monitoring equipment and provisions, including the layout of all settlement points and other monitoring points. Provide two copies of pre-construction video, pre-construction survey of adjacent structures and photographs with captions to document pre-construction conditions prior to beginning HDD construction.

I. Contingency Plan for Remediation of Potential Problems: Submit a Contingency Plan for Remediation of Potential Problems that may be encountered during the drilling operations. The contingency plans shall address the observations that would lead to the discovery of the problem and the methods that would be used to mitigate the problem. Potential problems that shall be addressed in this Plan include, but are not limited to, the following:

1. Loss of returns/loss of circulation of drilling fluids.

2. Inadvertent returns/hydrofracture or surface spills resulting in drilling fluids entering water or reaching the ground surface. Stand-by equipment shall be in place and provided by the Contractor to recover fluids at all times during drilling operations. Turbidity barriers or other appropriate methods of containing and clean-up shall be part of the stand-by equipment to minimize dispersion in the event that drilling fluids reach ground surface. Submit letter signed by an authorized representative confirming that the Plan will be followed. If required by permit conditions, revise the Plan as necessary to satisfy the associated regulatory agency.

3. Encountering obstruction during pilot bore or reaming/pullback.

4. Drill pipe or product pipe cannot be advanced.

5. Deviations from design line and grade exceed allowable tolerances.

6. Drill pipe or product pipe broken off in borehole.

7. Product pipe collapse or excessive deformation.

8. Utility strike.

9. Deviation from planned bore path.

10. Hydrolock occurs or is suspected.

11. Excessive ground settlement or heave.

J. Disposal of Spoils and Drilling Fluids Plan: Submit Plans for disposal of waste materials resulting from the pipeline construction, including drilling fluids, cuttings, waste oil, fuel, discharge water, etc. Identify the disposal site and submit a letter indicating willingness and legal authority to accept the described and anticipated waste products.

K. Equipment Layout Plan: Submit a plan which provides sketches depicting the layout and locations of equipment within the rig side work area and pipe side work area, including any proposed drilling fluid containment and recirculation pits. Confirm that all operations shall be completely contained within the right-of-way, permanent and temporary construction easements shown on the Contract Documents.

1. Provide barricades, fencing, or other safety measures to prevent public access into work and staging areas.

2. Provide adequate control of surface water and drilling fluids drainage and runoff, and provide silt fences, hay bales, and/or wattles to prevent surface water or drilling fluids from being transported off-site.

L. Inadvertent Return and Surface Spill Contingency Plan: An Inadvertent Return and Surface Spill Contingency Plan shall be prepared for the installation of the pipeline using HDD and the Contractor shall be capable of implementing the plan immediately should an Inadvertent Return or Surface Spill occur during the HDD work. Submit letter signed by an authorized representative confirming that the Plan will be followed. If required by permit conditions, revise the Plan as necessary to satisfy the associated regulatory agency.

M. Horizontal Directional Drilling Work Plan: Submit a HDD Work Plan complete with drawings and written description identifying details of the proposed method of construction and the sequence of operations to be performed during construction including placement, entry and exit points, method of attachment and pullback or carrier pipe.

1. The Plan shall include a detailed plan and profile of the bore, showing utilities and structures and plotted at a scale no smaller than one inch equals 40 feet horizontal and one inch equals four feet vertical. Any proposed deviations from the Contract Documents shall be shown.

2. The HDD Work Plan shall provide details of the planned bore path and the method for monitoring and controlling the speed, line, grade and rate of fluids delivery. It shall include the sequence, size, and description of each reamer and capabilities of each through anticipated geologic formation. The drill plan shall also include details on the swabbing of the borehole prior to pullback of the pipe.

N. Soil Separation Plan: Submit details on the pump and soil separation plant. Include dimensions, manufacturer's specifications, pump capacity, noise rating, and soundproofing details on the system.

1. Pump capacity shall be specified for water at sea level elevation, and adjusted for actual elevation and fluid viscosity.

2. Provide details on the generator, including dimensions, noise ratings at 25 feet, and soundproofing. Confirm that the generator and other on-site equipment can be operated without exceeding the maximum allowable noise tolerances specified in the Contract Documents.

O. Maximum Allowable Drilling Fluid Pressure Calculations: Shall submit calculations identifying the critical downhole pressure that would cause hydrofracture or inadvertent return of drilling fluid. The calculations shall identify the critical points in the alignment and near the exit point where the soil cover above the bore is low. The calculations shall identify all parameters used and state all assumptions made in the calculations. The calculations shall be signed and sealed by a licensed Professional Engineer registered in the State of Florida. The Contractor is cautioned that the typical installation of the HDD pipelines from 3-feet to 6-feet of cover may result in a high risk of inadvertent return depending on the water table at the time of drilling and/or excessive drilling fluid pressure.

P. Pipe Filling Methods and Testing: Submit methods and procedures for filling the pipe with water during pull back and testing, See the requirements in paragraph 3.05 H.

Q. Pipe Stress Calculations: Submit calculations for pipe stresses expected to result from the pullback, bending, buckling loads, earth loads, groundwater loads, and any other installation and service loads expected to be exerted on the pipe. The calculations shall identify all parameters and state all assumptions made in the calculations. All assumptions used in the calculations, including the radius of curvature, assumed drilling fluid weights, pipe assumed to be filled during pullback, and temperature shall be provided. These calculations shall be signed and sealed by a licensed Professional Engineer registered in the State of Florida.

R. Pullback Calculations: Submit calculations for pullback loads for the conditions and operating practices anticipated. In addition to the tensile pullback loads, bending, buckling and combination loads must be considered in design. The calculations shall identify all parameters and state all assumptions made in the calculations. These calculations shall be signed and sealed by a licensed Professional Engineer registered in the State of Florida.

S. Radius of Curvature Confirmation: Confirm that the bore can be completed using the radius of curvature and geometry shown on the Contract Drawings along with the calculations showing that installation stresses do not exceed allowable pipe stresses.

T. Rig Capacity Plan: Submit a plan which provides details on the capacity of the drill rig verifying that the pullback capacity is greater than the required pullback calculated and submitted under paragraph 1.05R.

U. Contact Grouting Plan: Submit descriptions of methods, equipment, and materials to be used for contact grouting any areas where over-excavation, aborted bores, voids, or cavities are created or encountered during construction.

V. Construction Records: The following shall be submitted as construction progresses and at the completion of construction.

1. Daily Logs and Records: Submit complete, legible, written daily logs and records as specified in Paragraph 1.07C and as directed by the Engineer, by noon of the following day to which the records correspond.

2. Drilling and Reaming Rates: Submit maximum drilling speeds and reaming rates for pilot bore and each reaming pass and confirm that the pump capacity is adequate for these anticipated drilling rates for the mud and/or drilling fluid weights and viscosities anticipated. These shall be submitted to the Engineer on a daily basis.

3. Drilling Fluid Viscosity and Density (Mud Weight):
   a. Mud Pump: Submit measured mud flow rates and pressure as measured at the pump used during pilot boring and reaming of the bore measured at a minimum of three times per shift or at least once per 200 feet of drilled or reamed length, whichever is more frequent, with at least two hours between readings.
   b. Downhole: Submit drilling fluid pressure, as recorded at the drill head by the downhole probe/tool, used during pilot boring and reaming of the bore measured continuously. If a magnetic downhole probe/tool is used, the probe/tool shall be capable of measuring the downhole pressure.

4. Pilot Bore As-Built Profile: Submit the updated pilot bore profile as drilling is underway on a daily basis and an as-built profile of the pilot bore within 24 hours of completion of the pilot bore.

5. Pulling Force Records: Submit the actual recorded pulling forces during pull back.

6. Pressure Test Records: Submit all pressure test records for both the pre-installation and post-installation tests. These shall be submitted within 24 hours of completion of such tests.

7. Variations in Plan and Profile: Document variations between the actual Contract Drawings and profile of the bore path and the location shown on the Contract Drawings. Notify in writing and by telephone the Engineer immediately upon discovery of any deviations.

8. If a plan with details on how plans to monitor and protect adjacent and/or overlying structures, buildings, roadways, sidewalks and utilities was required during the pre-construction survey phase. Provide a post-construction survey and video of the settlement points and monitoring locations as specified in in paragraph 3.05 L.

W. Risk Mitigation Meetings: At least 15 working days prior to specified HDD segments of the work, the Contractor and HDD superintendent shall attend a risk mitigation meeting (or conference call) with representatives of the Engineer and District for <u>each</u> HDD crossing to discuss major operations milestones.

1. Specific risk mitigation meetings shall be held and include a discussion of the following as a minimum:
   a. Prior to drilling of pilot-hole to discuss the following at a minimum
      1) Traffic Control
      2) Rig mobilization and setup

3) Pilot bore drilling

b. Prior to reaming to discuss the following at a minimum:
   1) Pre-reaming and reaming.
   2) Layout of pipe

c. Prior to pullback to discuss the following at a minimum:
   1) Pressure testing of pipe prior to pullback.
   2) Final reaming and pullback of pipe.

d. Prior to testing to discuss the following at a minimum:
   1) Pressure testing of pipe after installation
   2) Pig test
   3) Protection and monitoring of adjacent and/or overlying structures, roadways, sidewalks and utilities.

X. Certified Work Zone Traffic Control Plan: Submit a control plan for proposed traffic lane or sidewalk diversions or closures as outlined in Section 01570. Plans shall depict detailed sequences and requirements for traffic control devices required, dimensioned positions of devices, and pavement striping. Before construction of work in the public right-of-way, coordinate with FDOT as applicable for traffic lane diversions or closures and obtain their permits or written approvals.

1.06 PERFORMANCE REQUIREMENTS

A. Provide all equipment, materials, and personnel necessary for completing the installation as shown on the Contract Drawing and specified herein. The equipment and materials shall include but are not limited to:

1. Directional drilling rig with all ancillary equipment, including drill pipe, drilling fluid, cutting tools, reaming bits, swivels, expanders, motors, pumps, hoses, mixing equipment, drilling fluid processing equipment (cuttings separation equipment), downhole survey equipment, downhole pressure equipment, gyroscope (a Global Positioning System (GPS) using a Gyro Steering Tool) or walk over location system, fluid pressure and flow rate monitoring equipment, spare parts, pipe handling equipment (cranes, backhoes, rollers, side boom tractors) control equipment, and office equipment.

2. Drilling fluids, water, fuel, lubricant, polymers, or other additives.

3. Any other expendable or reusable materials, supplies, and equipment needed for the installation.

B. The drilling equipment shall be capable of advancing through the geologic conditions to be encountered at the site, as described by the geotechnical investigation reports and as anticipated.

C. The drilling system shall include a fluid pump and separation plant that can achieve the rates of drilling fluid pumping, spoil separation, and slurry cleaning required to achieve planned production rates for the soils described in the geotechnical investigation report, and as anticipated. Shaker screens and hydrocyclones may be required for efficient separation of spoils. Be advised that the separation plant must fit within the allowable Work areas shown on the Contract Drawings, or in areas obtained with written approval from the affected property owner.

D. All spoil and slurry must be contained in trucks, tanks, approved recirculation pits, or other containers at all times. Dumping of spoil or slurry on the ground, discharge into sewers, or discharge into the water bodies will not be permitted. All spoils will be transported and disposed of off-site at an approved disposal facility that meets all State of Florida and local requirements.

E. Perform all Work within Work areas shown on the Contract Drawings or in areas obtained with written approval from the affected property owner.

F. The pipeline shall be installed using the radii of curvatures and entry and exit angles as shown on the Contract Drawings, unless deviations are approved in writing by the Engineer.

G. Vertical separation from existing utilities shall be a minimum of 18-inches unless otherwise noted. Refer to contract plans for horizontal separation requirements from existing utilities.

H. For sections of pipe that are fused/welded pipe rollers and lifters will be required to help the transition of the carrier pipe into the bore and to minimize the pull force. The number of pipe rollers and lifters shall be determined in accordance with the pipe supplier's recommendations. Location and spacing of the rollers and lifters will be done in accordance with the pipe manufacturer's recommendations based on bend radius and to protect pipe during pullback over hard or sharp surfaces. All pipe rollers and lifters will be in a condition so not to damage the pipe during construction activities.

I. Be responsible that all Work is done in conformance with all applicable federal, state, and local safety requirements. Required safety equipment and procedures shall be employed at all times. All materials and methods of construction shall meet the applicable requirements of the State of Florida Administrative Code.

J. The pipe shall be certified as meeting all requirements of the Contract Documents. The fused/welded fabricated pipe will be pressure-tested prior to pullback using a low-pressure air test of 3.5 to 5 pounds per square inch of pressure to check for potential leaks in accordance with the manufacturer's instructions. All installed in place carrier pipe will be hydrostatically pressure tested after installation is completed in accordance with Section 02623 as appropriate for the material installed.

K. Allow access to the District and/or Engineer and shall furnish necessary assistance and cooperation to aid the Engineer in observations and data and sample collection, including, but not limited to the following:

1. The District and/or Engineer shall have full access to the operator control container prior to, during, and following all HDD operations. This shall include, but not be limited to, providing visual access to real-time operator control screens, gauges, and indicators.

2. The District and/or Engineer shall have full access to the slurry separation plant prior to, during, and following all HDD operations. This shall include, but not be limited to, full access to shaker screens, hydrocyclones, conveyor belts, and slurry and spoil holding tanks. The Engineer shall be allowed to collect soil samples from the shaker screens and/or spoil holding tanks on the slurry separation plant a minimum of once per installed pipe section, and whenever changes in conditions are observed or suspected. If requested, assist in the collection of these samples as directed by the Engineer.

L. Comply with all local noise ordinances. Sound levels in excess of these values are sufficient cause to have the Work halted until equipment can be quieted to these levels. Work stoppage for excessive noise shall not relieve the Contractor of the portions of this Specification including, but not limited to completion of all Work within specified Contract Time and Contract Price. Submit a Plan prior to construction identifying all noise reduction/abatement procedures. The Plan will be reviewed by the Engineer prior to construction.

1. If mufflers cannot achieve the necessary noise reduction, noise abatement shall be accomplished by installation of baffles (or other acceptable means) positioned to break line-of-sight from the noise source to affected residences and/or commercial structures. Minimum noise abatement measures shall consist of equipping all engines with hospital grade mufflers or silencers.

1.07 QUALITY ASSURANCE

A. Contractor Qualifications and Experience: The Contractor shall meet the following minimum qualifications:

1. Be licensed in the State of Florida as an underground utility Contractor for a minimum of five years.

2. Have at least 10 years of demonstrated successful experience installing pipelines by the means of HDD.

3. Have successfully completed three water or sewer projects where the carrier pipe was installed with HDD techniques meeting the following criteria. Experience of employees on past projects where subcontractors were hired to perform the HDD cannot be used to meet Contractor requirements.
   a. The carrier pipe nominal diameter of at least 30-inches.
   b. Minimum length of 1000 linear feet in a single pull through soil
   c. Contractor shall provide the following for each project:
      1) Project Description
      2) Pipe Size, Length, Material, DR
      3) Bore Length
      4) Soil Types
      5) Owners' contact information
      6) Engineers contact information
      7) Change Orders
      8) Scheduled Completion Date and Actual Completion Date

4. The Contractor shall have successfully completed one water or sewer project where the carrier pipe was installed with HDD techniques, meeting the following criteria.
   a. The carrier pipe must be HDPE pipe.
   b. Minimum carrier pipe nominal diameter of at least 30-inches.
   c. The depth at deepest point of HDD shall be at least 30-feet
   d. Minimum length of 1800 linear feet in a single pull through soil
   e. Contractor shall provide the following:
      1) Project Description
      2) Pipe Size, Length, Material, DR
      3) Bore Length
      4) Soil Types

5) Owners' contact information
6) Engineers contact information
7) Change Orders
8) Scheduled Completion Date and Actual Completion Date

5. Employ skilled, experienced superintendent(s), equipment operator(s) and personnel throughout the project. The superintendent for this project shall have at least 10 years of successful experience using the HDD process, with at least one project meeting the criteria identified in Paragraph 1.07A.4.

6. The HDD equipment operator for this project shall have at least five years of successful experience using the HDD process, with at least one project meeting the criteria identified in Paragraph 1.07A.3.

B. Furnish resumes of the superintendent(s) and key personnel. Personnel experience records should include project names, locations, pullback lengths, ground conditions, pipe materials, project description, project District, Engineer, and references with names, addresses, and telephone numbers. The superintendent listed in the submittal shall be on site during all construction related activities required for the HDD installation for this project. Do not alter personnel assigned to the project without prior written approval from the Engineer and District.

C. Daily Logs and Records: Daily logs and records shall be maintained and shall include the following:

1. Drilling lengths.

2. Location of drill head.

3. Drilling fluid pressures measured at the pump and the downhole annular drilling fluid pressure at the drill head and drilling fluid flow rates measured at the pump.

4. Drilling fluid losses.

5. Inadvertent returns.

6. Drilling times required for each pipe joint.

7. Any instances of retraction and re-drilling of the pilot bore or segments thereof

8. Any other relevant observations, including any observed settlement, heave, frac-outs, or surface spills.

9. The downhole annular drilling fluid pressures shall be measured and recorded throughout the pilot hole drilling. These records shall be maintained and provided daily to the Engineer. The position of the drill head shall be continuously tracked and recorded. A plot of actual locations of the bore path shall be maintained and updated daily, or more frequently, as directed by the Engineer. Pason or approved equal system shall be used for on/off site monitoring. These records shall be maintained and provided daily to the Engineer.

D. Advance Notices and Inspections: Provide at least 72 hours advance written notice to the Engineer of the planned inspection of major drilling activities, including pilot bore launch, pre-reaming, reaming, and pipe pullback. Immediately notify the Engineer, in writing, when any significant problems are encountered or if ground conditions are considered to be materially and significantly different than those represented with the geotechnical investigation report. All Work shall be performed in the presence of the Engineer, unless Engineer grants prior written approval to perform such Work in Engineer's absence.

E. Surveying Equipment and Procedures: All surveying equipment used for downhole surveying and tracking of the bore path and drill head shall be inspected and calibrated by the equipment manufacturer prior to use. Proof of this inspection and calibration shall be provided to the Engineer prior to commencement of drilling operations as specified in Paragraph 1.05G.

PART 2 PRODUCTS

2.01 DRILLING FLUIDS

A. Select drilling fluid mixture proportions to ensure continuous circulation, bore stability, reduce drag on the pipe, and completely fill the annular space between the bore and the pipe to control settlement. Manage and dispose of drilling fluids. Drilling fluids shall not be disposed of on-site or discharged to sanitary or storm sewers, or the waterways or adjacent wetlands.

2.02 DRILL PIPE

A. Provide high quality drill pipes that have been inspected and determined to be adequate for the project requirements. Bent, racked, or fatigued drill pipes shall not be used. Threads must be in good condition. The length of each drill pipe shall be measured and recorded.

2.03 PIPE

A. Provide carrier pipe in accordance with Section 02623.

B. The pipe thickness must conform to the most conservative design with respect to design calculations for the critical combination of internal and external pressure, pullback and bending. The carrier pipe shall not be greater than the dimension ratio (DR) specified in Section 02623.

2.04 WATER

A. Refer to Section 01500 for temporary water service for construction use.

2.05 CEMENT GROUT

A. Cement grout shall consist of a mixture of 1 part cement to 6 parts sand. The amount of cement may be increased or decreased as necessary and as permitted by the Engineer to provide good flowing characteristics.

PART 3 EXECUTION

3.01 GENERAL

A. Provide adequate control of surface water and drilling fluids drainage and runoff, and provide silt fences, hay bales, and wattles to prevent surface water or drilling fluids from being transported off-site.

B. Do not initiate HDD until all submittals as specified in Paragraph 1.05 are received, reviewed, and approved by the Engineer.

C. Do not initiate HDD until all required permits are obtained. Copies of all permits shall be provided to the Engineer prior to construction.

D. Provide barricades, fencing, or other safety measures to prevent public access into Work and staging areas.

3.02 PROTECTION OF UNDERGROUND UTILITIES

A. The Contract Drawings show existing buried utilities that are believed to be near the directional drill alignment. There is no guarantee that these utilities are located as shown or that other utilities are not present. Field locate all nearby utilities or other potential subsurface obstructions that may interfere with the Work.

B. Notify "One Call" system to request marking of utilities that subscribe to One Call, and shall individually notify all other known or suspected utilities to request marking of these utilities. Confirm that all requested locates are made prior to commencing drilling operations. Make all diligent efforts to locate any unmarked or abandoned utilities using all available information, maps, and drawings. Visually confirm and stake all existing lines, cables, or other underground facilities including exposing all crossing utilities and utilities within 20 feet laterally of the centerline of designed drilled path.

C. Control drilling practices to prevent damage to existing utilities and pavement.

D. Make diligent effort to locate surface evidence of any other potential subsurface obstructions, such as piers and piles.

E. Be responsible for all losses and repairs occasioned by damage to underground utilities, structures and pavement resulting from drilling operations.

3.03 WORK STAGING AREA

A. Barricades, Warning Signs, and Lights: Erect appropriate barriers, warning lights, and signs, painted with approved colors, warnings, and graphics, in accordance with approved Traffic and Safety Plans, to ensure adequate warnings to personnel and the public.

B. Combustible Materials: Combustible materials (fuel, oil, lubricants, etc.) shall be stored off-site or in a well-ventilated storage facility removed from the immediate vicinity of the drilling area by at least 20 feet.

C. Construction Impacts: Maintain the Work area in a manner that shall minimize adverse impacts on other public use activities. Proceed with Work in a safe, orderly manner, while maintaining the Work site free of debris and unnecessary equipment and materials.

D. Control of Drilling Fluids: Follow all requirements of the Inadvertent Return and Surface Spill Contingency Plan as submitted and accepted and control operational pressures, drilling mud weights, drilling speeds, and any other operational factors required to avoid hydrofracture fluid losses to formations, and control drilling fluid spillage. This includes any spillages or returns at entry and exit locations or at any intermediate point. All inadvertent returns or spills shall be promptly contained and cleaned up by the Contractor. Maintain on-site mobile spoil removal equipment during all drilling, pre-reaming, reaming, and pullback operations and shall be capable of quickly removing spoils. Immediately notify Engineer of any and all inadvertent returns or spills and immediately contain and clean up the return or spill.

E. Removal of Temporary Facilities: At the completion of construction, remove all temporary facilities installed. Unused soil, aggregate, and other materials shall be removed and disposed of at approved sites in accordance with Federal, State, and Local regulations. Any damage to pavement, streets, lawns, common areas, and sidewalks shall be restored to original or better conditions at no additional cost to the District. All grassed areas disturbed by construction shall be sodded.

F. Site Security: Install an enclosure fence around the Work area. The enclosure fence shall be adequate to prevent entry of unauthorized persons. Be completely responsible for site security throughout the entire duration of construction.

G. Temporary Lighting: Procure and maintain all temporary lighting needed for operations, safety, testing, and inspection. Temporary lighting shall be removed immediately after completion of construction.

H. Work Staging: Be responsible for obtaining staging areas and all necessary approvals and permits for storage of equipment and materials, parking, drilling and other Work. See Section 01014 for additional requirements.

I. Pipe Layout Staging Areas:

1. Locate and secure staging areas for the HDD work. Visit the proposed sites prior to submitting a bid for this work. Do not conduct any excavation or earthwork activities in the pipe staging area without prior acceptance by the Engineer. Be responsible for securing all necessary permits and approvals for the use of the temporary staging area layout of the pipe. All costs associated with this shall be included in the Contractor's bid price.

3.04 MOBILIZATION

A. Mobilize all equipment, materials, and personnel necessary to construct the carrier pipeline using the HDD process at the locations shown in the Contract Drawings.

1. Entry Area: Set up temporary workspace within the areas delineated on the Contract Drawings. Employ appropriate precautions and measures to prevent erosion, surface drainage, and spillage of drilling fluids or other materials that could adversely impact the environmental quality of the site. Use appropriate precautions and measures to minimize erosion and contain any spillage or runoff. Shovels, brooms, buckets, and barrels shall be

kept on-site to facilitate containment and cleanup. A vacuum truck or trailer unit will be on standby and capable of responding within one hour to any spill or inadvertent return incident.

2. Exit Area: The exit area shall have appropriate precautions and measures for containing drilling fluids and cuttings. Use appropriate methods to minimize erosion and runoff. Containment and cleanup equipment shall be available to contain and clean up any surface spills and inadvertent returns.

3. Pipe Layout Area: Layout area shall be free of stones, wood, debris, and obstructions. Pipe rollers shall be provided by the Contractor during the fusion process to facilitate pipe fusion and pullback. Pipe rollers and all pipe handling shall be non-abrasive and cushioned using special devices and methods to prevent damage as specified in Section 02623. Pipe rollers that are uncushioned, unsteady or in any way pose a possibility of damaging or scratching the pipe shall not be used. The pipe lay out area may not allow the entire length to be fused in a single length before start of pull-in. Plan work accordingly. Maintain access to all properties unless shown otherwise on the Drawings, specified herein, or written permission has been granted by the individual property owners.

3.05 HORIZONTAL DIRECTIONAL DRILLING

A. Drill Rig Capacity: The capacity of the directional drilling system shall be adequate to install the specified pipeline.

B. Pump Capacity: The pumps shall be adequate to supply the required flow rate and pressures at the anticipated drilling fluid viscosity at all times. Drilling speeds shall not exceed pump capacity. Drilling speeds shall be monitored continuously during HDD operations.

C. Bore Tracking and Monitoring: At all times during the pilot bore provide and maintain a bore tracking system that is capable of accurately locating the position of the drill head in the x, y, and z axes. Record these data at least once per drill pipe length or every 30 feet, whichever is less.

1. Tracking System: Monitor and record x, y, and z coordinates relative to an established surface survey benchmark. A downhole wire line tracking locator system shall be installed and shall be supplemented by a downhole gyroscope (a Global Positioning System (GPS) using a Gyro Steering Tool) or walk over system at the surface.

2. Deviations between the recorded and design bore path shall be calculated and reported on the daily log. If the deviations exceed tolerances specified, such occurrences shall be reported immediately to the Engineer. Undertake all necessary measures to correct deviations and return to design line and grade.

3. Drilling Fluid Pressures and Flow Rates: Mud Pump Drilling fluid pressures and flow rates shall be continuously monitored and recorded at least three times per shift or at least once per 200 feet of drilled and reamed length, whichever is more frequent with at least two hours between readings. The pressure shall also be continuously monitored and recorded at the downhole probe/tool (at drill head). If a magnetic downhole probe/tool is used, the probe/tool shall be capable of measuring the downhole pressure. Flowrates shall be measured at the pump. These measurements at the pump shall be made during pilot bore drilling, reaming, and pullback operations.

4. Drilling Speeds: Maximum allowable drilling speeds shall be calculated for pilot boring and each reaming pass and shall not be exceeded for pilot boring or reaming passes. Measurements shall be taken every 20 feet or 30 minutes, whichever is more frequent.

5. Drilling Fluid Viscosity and Density (Mud Weight): Measure and record drilling fluid viscosity and density at least three times per shift or at least once per 200 feet of drilled and reamed length, whichever is more frequent with at least two hours between readings, using calibrated Marsh funnel and mud balance. These measurements shall be included in daily logs submitted to the Engineer. The Contractor shall document modifications to the drilling fluids, by noting the types and quantities of drilling fluid additives and the dates and times when introduced. The reason for the addition of drilling fluid additives or other modifications shall be documented and reported.

D. Location of Entry and Exit Points: Entry and exit points are shown on the Drawings. Where entry and exit points are shown, they shall be constructed in the location shown, unless otherwise approved in writing by the Engineer or as shown on the approved HDD Work Plan. Employ experienced licensed surveyors registered in the state of Florida to locate the entry and exit points, and to establish horizontal and vertical datum for the bore and the pipe layout and assembly areas

E. Entry and Exit Angles: Drill entrance angles shall be as shown on the Contract Drawings unless otherwise approved in writing by the Engineer.

F. Pilot Bore: The pilot bore shall follow the design path of the bore shown on the Contract Drawings. Attention is directed to the Survey Data Table and survey shown on the Drawings indicating the vertical and/or horizontal location of buried utilities or structures.

1. Horizontal and Vertical Tolerances: Horizontal and vertical deviations shall be less than plus or minus one foot from the design path centerline. The Contractor shall continuously monitor horizontal and vertical position and record the position at least once per drill pipe length, or at 30 feet, whichever is less.

2. Radius of Curvature: The radius of curvature shall not be less than that shown on the Contract Drawings. The radius of curvature shall be calculated over the distance of three drill pipe sections.

3. Entry and Exit Tolerances: The location of the entry and exit points shall be in accordance with 3.05, D, unless otherwise accepted in writing by the Engineer in the approved HDD Work Plan. Be solely responsible for all Work necessary to correct excessive deviations from line and grade, including redrilling, redesigning connections, and acquiring additional easement, at no additional cost to the District and without schedule extension.

4. Pre-reaming and Reaming: The pilot bore shall be pre-reamed and reamed using equipment and methods submitted. Completely pre-ream the bore to the final diameter prior to pullback. Multiple reams may be required to achieve the desired borehole diameter.

G. Low Pressure Air Test: For welded/fused pipe, the Perform a low-pressure air test in accordance with paragraph 1.06 K prior to pipe pullback.

H. Pipe Pullback:

1. A final swabbing of the bore path prior to pullback of the carrier pipe is required.

2. Pipe shall be installed by pulling it into the reamed bore path in a continuous operation, behind a final reaming tool.

3. The pipe shall be isolated from excessive torsional and axial stresses by a swivel device.

4. Measurements shall be made, recorded, and submitted on the daily logs during final reaming and pipe pullback.

5. Pulling Loads: The maximum pull (axial tension force) exerted on the carrier pipeline shall be measured continuously and limited to the maximum allowed by the pipe Manufacturer so that the pipe or joints are not overstressed. A factor of safety over the maximum allowable is not required. Anticipate that the pipe will be full of water as it is pulled. To provide the most effective pull force for installation of the product pipe that has entered the bore hole and is below level, it must be maintained full of water (i.e. ballast) during the entire pullback process. The above grade portion of the pipe will be kept empty during pulling.

6. Pipeline Support: The pipelines shall be adequately supported during installation so as to prevent overstressing or buckling. Provide adequate support/rollers along the stringing area to support the required length of the carrier pipe for each bore. Such support/rollers shall be spaced according to the pipe supplier, and the rollers be comprised of a non-abrasive cushioned material arranged in a manner to provide support to the bottom and bottom quarter points of the pipeline allowing for free movement of the pipeline during pullback. The pipe layout area shall be cleared of all large stones, construction debris, or other foreign objects that could damage the piping during pullback.

7. The leading end of the pipe shall be closed during the pullback operation, in accordance with the pipe supplier's recommendations. A pulling head shall be used that is rated at the allowable pull force capability of the pipe section being installed, in accordance with the pipe supplier's recommendations.

8. Each length of pipe shall be inspected and cleaned as necessary to be free of debris immediately before joining.

9. Tracer wire will be attached to the leading end of the pipe pulling head and shall extend the full length of the installed pipe.

10. Handle, at all times, the carrier pipe in a manner that does not overstress or otherwise damage the pipe. Vertical and horizontal curves shall be limited to manufacturer's recommended bend radius so that wall stresses do not exceed the allowable bending radius as recommended by the pipe supplier. If the pipe is buckled or otherwise damaged due to acts or omissions, the damaged section shall be removed and replaced at his expense. Take appropriate steps during pullback to ensure that the carrier pipe and tracer wires will be installed without damage.

11. The carrier pipe shall be filled with water as it enters the bore to reduce potential deflections due to external loads and pullback loads and to ensure that adequate internal pressure is maintained at all points to counter balance external pressures.

12. Fusion of Mid-welds during pull-back will not be permitted without prior approval from the Engineer in the HDD Work Plan.

13. Monitor and inspect pipe rollers and method for suspending pipe at entry during the pullback operation to avoid damage to the pipe.

14. Cease operations if the pipe is damaged and shall remove the pipe from the bore and repair the pipe using the Manufacturer's recommended procedure or replace the damaged pipe before resuming installation.

15. Be responsible for damage to the pipe resulting from installation or contact grouting, including costs for replacement and labor and materials at no cost to the District.

16. After the carrier pipe is completely pulled through the bore, a sufficient period as recommended by the pipe Manufacturer shall be provided before the final pipe tie-in.

17. Upon completion of pullback and grouting, perform the following cleaning on the completed pipeline.
    a. After the installation of the carrier pipe, swab inside of pipe with a flexible polyurethane foam swab complete with rear polyurethane drive seal.
    b. In tandem, swap with a one- to two-pounds per cubic foot pig for proving, sweeping and sealing and a five- to seven-pounds per cubic foot pig for wiping.
    c. The tandem swabs shall make a minimum of two passes through the entire pipeline.
    d. Cleaning and flushing shall be accomplished by propelling the swab down the pipeline to the exit point with potable water. Flushing shall continue until the water is complete clear.

18. Final Hydrostatic Test: Conduct a final hydrostatic test of the installed pipeline. Final test shall be in accordance with Section 02623. Repair any defects discovered during the test, and repeat until the pipe passes the test.

I. Contact Grouting: Grout a portion of the annular space (i.e., the first 100 feet from entry point and the last 100 feet before exit point) between the bore and the outer diameter of the product pipe prior to pigging described in 3.05 H of this section. Grouting shall be completed within 48 hours of completion of the final hydrostatic test. Grouting procedures shall be in accordance with approved submittals. The grouting operations shall ensure that the annulus is filled with grout within the first 100 feet from entry point and the last 100 feet before exit point. Grouting may be accomplished using one or more of the methods described below, or an alternative, subject to Engineer' acceptance. Ensure that the annulus does not provide a preferential pathway for seepage regardless of the method(s) used and shall ensure that settlements shall not cause damage to existing utilities, roadways or structures.

1. Tremie pipe. Tremie pipes shall be inserted into the borehole, for at least 100 feet from both entry and exit ends after the pipe pullback is completed to grout the annular space between borehole and pipe, or any other voids created or encountered above the borehole. Tremie grout pipes shall be not less than 1-1/4 inch and not more than 2-inch diameter Schedule 40 PVC, and shall be inserted at the crown and at two locations 60 degrees from

the crown. Grouting pressures shall be carefully controlled and monitored to avoid applying excessive pressure to the pipe and to avoid heave or hydrofracture. The pipes shall be filled with water during grouting to counterbalance grouting pressures and to avoid excessive heat of hydration as the grout sets that could damage the pipes.

2. Mix grout into drilling fluids and inject with drilling fluid as pipe is pulled back final 100 feet to grout annulus at entry side. Grout shall be mixed into drilling fluid recirculation/distribution system and shall be injected as drilling fluid as pipe is pulled back final 100 feet. The grout mixture shall satisfy performance requirements of drilling fluid before set and requirements of annulus grout after set. Retarding agents may be incorporated into grout mixture to allow sufficient time to complete pipe pullback before initial grout set. The exit side annulus shall be grouted by inserting a tremie pipe into the bore annulus for at least 100 feet from the exit end as described in 1. above. Grout/drilling fluid injection pressures shall be less than pressures that could result in collapse of the pipe or hydrofracture of the surrounding soil.

J. Obstructions: Notify the Engineer immediately in the event that an obstruction, such as a boulder or rock, is encountered that prevents further advancement of the drill pipe, or pullback of the pre-reamer, reamer, and/or pipe. Make all diligent and reasonable efforts to advance past the object by drilling slowly through the object, pulling back, and drilling along a new bore path that avoids the object, or excavating and exposing and removing the object, and all other reasonable attempts to continue the bore. Notify the Engineer or proposed measures to attempt to advance past the object, prior to initiating the attempt. If attempts to pullback and re-drill are made, adhere to line and grade tolerances established in this Specification section, unless the Engineer approves variance, in writing, prior to the attempt to re-drill. The Contractor and Engineer shall investigate the cause and together determine an appropriate response. Appropriate response may include revisions to equipment or methods, retraction and re-drilling of a portion of the bore, or abandonment of the hole. If abandonment is deemed necessary, recover, to the extent practicable, any drill pipe, product pipe, and tools in the bore, and properly abandon the bore by contact grouting unless otherwise directed in writing by the Engineer. If the bore is abandoned, begin a second attempt to install the pipeline at an alternate location subject to approval, in writing, by the Engineer. Take all reasonable actions to complete the installation with minimal delays. The extra costs and payments associated with encountering a confirmed obstruction shall be negotiated in accordance with General Conditions.

K. Site Restoration and Demobilization: Remove all equipment, materials, drilling fluids, muck, waste, and debris from the site and restore the site to its original condition upon completion of the installation. Restoration and demobilization shall be completed within seven calendar days of the completion of the pipeline installation.

L. Settlement Monitoring: Visually monitor for settlement or heave before and during drilling and grouting operation at the locations shown on the plans and as determined during the pre-construction survey. The settlement monitoring locations shall be surveyed to the nearest 0.01 foot and recorded prior to drilling operations and each day drilling operations are ongoing. A final record of spot elevations shall be recorded two weeks after pipe installation is complete and presented with the record drawings. Areas found to have significantly settled or heaved will require restoration. The Engineer will determine what constitutes significant settlement or heave. Restore these areas at no cost to the District.

END OF SECTION

SECTION 02495
GEOTECHNICAL INSTRUMENTATION

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Work described under this section pertains to monitoring of excavations, dewatering, excavation support systems, jack and bore, and/or other construction activities that may cause deformation and vibrations.

B. Employ an instrumentation specialist (or specialty firm) to review the Contract Work and prepare an instrumentation installation and monitoring plan.

C. Furnish all materials, equipment, labor, and services required for the complete installation, maintenance, protection, and monitoring of instrumentation and reporting of collected data for all instrumentation on buildings, utilities, and in the ground adjacent to the site or on the site, as specified in this Section and as necessary to monitor construction performance and impacts on adjacent property.

D. Establish response actions to be taken if the maximum allowable instrument readings are exceeded so that existing structures and utilities are protected from damage. Implement response actions if maximum allowable instrument readings are exceeded.

E. Dispose of all instruments at the end of the project as instructed by the Engineer.

1.02 RELATED WORK

A. Dewatering and drainage are included in Section 02140.

B. Jack and Bore is included in Section 02157.

C. Excavation, Bedding and Backfill for Pipe is included in Section 02221.

D. Excavation Below Normal Grade and Bedding Rock Refill is included in Section 02223.

E. Excavation Support and Protection is included in Section 02311.

F. Horizontal Directional Drilling is included in Section 02413.

1.03 SUBMITTALS

A. Submit in accordance with Section 01300.

B. Submit for review by the Engineer the following information four weeks prior to instrument installation:

1. Installation Plan and Schedule: Full details of the proposed plan and schedule for installing and monitoring instruments, including proposed locations, types, installation methods, and monitoring schedule of the instruments.

2. The names, qualifications, and experience of the personnel or subcontractor(s) who will install the instruments, perform optical level survey and vibration monitoring, read the instruments, and report data to the Engineer demonstrating compliance with “Quality Assurance” Article included in this specification.

3. Layout of monitoring points, observation wells, seismographs and reference points and description of monitoring provisions, including full details of the proposed instruments, proposed plan and schedule for installing the instruments, and schedule for monitoring and data reporting.

4. Description of methods for installing and protecting all instrumentation including but not limited to seismographs, observation wells, crack gages, monitoring points, and reference points.

5. Copies of all instrument calibrations and certifications specified.

6. Groundwater observation well construction details including casing type, filter gradation, screen interval, grout mix, drilling methods, and depth of wells.

7. Field Calibration: Within five working days of performing a field calibration, submit results of the calibration to the Engineer.

8. Reports and Records: Provide reports of monitoring data to the Engineer. Include the following minimum information:
   a. Preconstruction survey.
   b. As-installed location plan, installation records and baseline values for all instrumentation.
   c. Monitoring data for all instruments with plots against threshold values.
   d. Weekly records of crack monitors, including photographs with readings.
   e. Event reports and summary from vibration monitoring.
   f. Discussion and associated action related to any result exceeding the threshold values set herein.

9. Certificates: For each seismograph instrument to be furnished submit a certificate issued by the instrument's manufacturer stating that the manufacturer has inspected and tested each instrument before it leaves the factory to confirm that the instrument is working correctly and has no defects or missing parts.

10. Submit three copies of the pre-construction condition surveys as specified herein.

C. Submit proposed remedial measures to the Engineer of action to be taken in the event that the instrument Threshold Values are reached.

1.04 DEFINITIONS

A. Surface Monitoring Points (SMPs): Inscribed marking or approved surveyor's nail installed to measure vertical (elevation) movement.

B. Deformation Monitoring Points (DMPs): Fixed markers placed on existing utilities and structures to measure both vertical and horizontal movement. Initial coordinate locations and vertical controls are determined by optical survey methods.

C. Excavation Support Monitoring Points (ESMPs): Inscribed marking or fixed makers placed on excavation support systems to measure horizontal movement of the excavation support system.

D. Utility Monitoring Points (UMPs): Steel rod inside fully cased hole that is resting on existing utilities or underground structures to measure movement of the existing underground structure or utility.

E. Groundwater Observation Wells: Screened or slotted pipe with solid riser pipe installed in a drilled hole with the annulus around the pipe backfilled with sand. Near surface groundwater levels are measured in the well.

F. Seismographs: Electronic recording device with vibration transducer capable of monitoring and recording ground vibrations induced by construction activity.

1.05 QUALITY ASSURANCE

A. Personnel Qualifications for Instrument Installation.

1. Employ qualified technicians with comparable experience in the installation of geotechnical instrumentation similar to that specified herein.

2. Employ a qualified Geotechnical Instrumentation Engineer who is a professional engineer, with at least five years of experience in the installation of instrumentation specified herein, to supervise and direct technicians and be responsible for instrument installation. This person is to be present at the installation site(s) to direct and supervise the installations, oversee the reading of the instrumentation and supervise the interpretations of geotechnical instrumentation data.

B. Installation of instrumentation shall, at all times, be performed in the presence of the Engineer.

C. The Contractor shall be responsible for all aspects pertaining to the installation, maintenance and monitoring of the geotechnical instrumentation specified herein.

D. Provide each instrument or component of instrument specified herein from an approved manufacturer currently engaged in manufacturing geotechnical instrumentation hardware of the specified types.

E. Surveyor Qualifications: The professional Land Surveyors shall be licensed in the State of Florida and with at least three years of experience in surveying of similar instruments. The professional Land Surveyors shall establish the Deformation Monitoring Points, Surface Monitoring Points, Utility Monitoring Points, and Excavation Support Monitoring Points and take baseline readings.

F. Perform optical level surveys, instrument readings, and report data. Personnel responsible for this work shall be qualified by a minimum of three years of experience with similar work.

G. Factory Calibration: A factory calibration shall be conducted on all seismographs prior to shipment. Certification shall be provided to indicate that the test equipment used for this purpose is calibrated and maintained in accordance with the test equipment manufacturer's calibration requirements and that, where applicable, calibrations are traceable to the U.S. National Institute of Standards and Technology.

H. Vibration monitoring shall be conducted by persons trained in the use of a seismograph and records shall be analyzed and results reported by persons familiar with analyzing and reporting the frequency content of a seismograph record.

I. Persons responsible for pre-construction surveys shall be professional engineers, licensed in the State of Florida, and shall have had a minimum of five years of professional experience in structural evaluation and conditions surveys.

1.06 TOLERANCES

A. Survey measurements for initial location of each of the instrumentation elements shall consist of determining the elevation and horizontal position with respect to benchmark(s) approved by the Engineer.

B. Monitoring Points (SMPs, DMPs, UMPs and ESMPs)

1. Elevations of all instrumentation shall be determined to an accuracy of plus/minus 0.01 feet.

2. The horizontal position of surface monitoring points shall be determined to an accuracy of plus/minus 0.1 foot.

3. The horizontal position of deformation monitoring points and excavation support monitoring points shall be determined to an accuracy of plus/minus 0.01 foot.

C. Should actual field conditions prohibit installation at the location and elevations specified in this Section, obtain prior acceptance from the Engineer for new instrument location and elevation.

1.07 DESIGN AND PROJECT REQUIREMENTS

A. Project Requirements

1. Install Geotechnical Instrumentation as required herein and as necessary to monitor ground conditions, ground response, and facilities to achieve specified project requirements, and prevent damage to facilities potentially affected.

2. Install the instrumentation in accordance with the approved Instrumentation Schedule.

3. The Engineer's monitoring of the installed instruments does not relieve the Contractor of the obligation to complete the project within the requirements specified herein and the Contractor shall take additional measurements as may be necessary.

B. Pre-Construction Survey

1. Prior to start of excavation work, installation of excavation support and dewatering work, engage the services of an independent professional engineer, licensed in the State of Florida, to conduct a pre-construction survey of existing structures and conditions within 100 feet of the anticipated excavation work and installation of excavation support.
   a. Coordinate activities, issue notices, obtain clearances and provide photographic and secretarial assistance necessary to accomplish the survey.
   b. Give notice in writing, to the property owner and any representative of local authorities required to be present at such survey. Notify in writing the dates on which

surveys are planned so that representatives are present during the examination. Provide copies of notices to the District and Engineer.

2. Record observations of the existing conditions for residences, buildings and other structures, which are affected.
   a. Provide the survey consisting of a description of interior and exterior conditions. Locate cracks, damage or other defects existing and include information to make it possible to determine the effect, if any, of the construction operations on the defect. Where significant cracks or damage exists, or for defects too complicated to describe in words, photographs shall be taken and made part of the record.
   b. The records of each property examined must be signed by the representatives present and, if practicable, by the property owner, whether or not they are present at the examinations.

3. Record of the pre-construction survey shall consist of written documentation, video and photographs of the conditions identified. At the completion of the survey, submit copies of the documentation to the District.

4. Upon completion of all excavation work and installation of excavation support, complete a similar examination of properties and structures where complaints of damage have been received or damage claims have been filed. Give notice to interested parties so that they may be present during the final examinations. Records of the final examination shall be signed and distributed as the original pre-construction survey.

5. Retain records in the Contractor's file for at least three years after completion of the Contract. In the event of damage claims, a report shall be prepared by the Contractor on the particular structures as requested by the Engineer from those notes and photographs and submitted to the District. Repair damage attributed to the Contractor’s activity promptly and completely to the property owner’s satisfaction to restore the conditions of the property to that existing prior to work.

C. Secure all required permits prior to the installation or removal of observation wells.

D. Provide and facilitate safe access to the instruments at all times. The Engineer may perform additional monitoring in a manner that will minimize unnecessary work delays. Allow and facilitate instrument monitoring as required by the Engineer. No claim for lost production time due to this activity will be allowed.

E. Maintain all instrumentation. Replace all damaged instruments within 24 hours. Report all damaged or non-functional instrumentation to the Engineer within 24 hours.

F. Availability of Data

1. Interpretations developed by the Engineer will be available to Contractor. Contractor may observe readings at any time or take their own supplementary readings.

2. Monitoring data is the property of the District and is not to be disclosed or published to third parties without the owner’s written permission.

3. Contractor is expected to make their own interpretations for their own purposes at no additional cost to the District.

PART 2 PRODUCTS

2.01 SURVEYING INSTRUMENTS

A. Elevations of all instrumentation shall be determined to an accuracy of plus/minus 0.01 feet.

B. Horizontal position of all instrumentation shall be determined to an accuracy of plus/minus 0.1 feet.

2.02 MATERIALS

A. General: All instruments and materials, including readout units, remain the property of the Contractor following completion of the Contract.

B. Furnish all installation tools, materials, and miscellaneous instrumentation components.

C. Surface protection for all instruments provided shall be flush with the surface in paved or other ground surface areas, at the time that the work is completed.

D. Locations and number of instruments shall be determined by the Contractor and approved by the Engineer.

GROUNDWATER OBSERVATION WELLS

E. Observation wells will be used to monitor the groundwater levels outside the excavation.

F. Pipe shall consist of 1-inch minimum inside diameter Schedule 40 PVC pipe.

G. Maximum screen size shall be 0.020-in unless otherwise approved by the Engineer.

2.03 MONITORING POINTS

A. Establish system of control points and monitor in accordance with the requirements herein.

1. Surface Monitoring Points (SMPs)
    a. SMPs will be used to monitor vertical deformation at or near the ground surface. Clearly identify all points with permanent easily readable letters and numbers as approved by the Engineer.
    b. Provide SMPs in paved areas consisting of a 2 inch long masonry nail, manufactured from hardened zinc–plated steel. Drive the masonry nail into an asphalt covered surface. Identify each nail individually with an identification tag or surface marking.
    c. Provide SMPs in non-paved areas consisting of a 3 ft. long, 3/4 inch diameter steel rod. Drive the rod into the ground or set in concrete in the ground such that no more than 3 inches of the rod is exposed above the ground surface. Round the top of the rod and punch-mark it at its center. Identify each rod with a surface marking.
    d. Provide SMPs on utility manholes consisting of an observable cross mark or welded bead on the top horizontal surface of utility manhole rims. Clean the surface within 3 inches of the point and mark it to permit easy identification of the exact point. Clearly identify the point shall using fluorescent spray paint adjacent to the point.

2. Deformation Monitoring Points (DMPs)

a. DMPs will be used to monitor vertical and horizontal movement of adjacent utilities and structures.
b. DMPs shall consist of nails, screws, reinforcing bars, bolts and similar materials with well-defined measurement points as approved by the Engineer. DMP's shall be firmly attached and shall be protected from damage and vandalism. Remove or cover with a protective box or cap as approved by the Engineer all elements of DMP's protruding more than [0.25-in.] [6 mm] Clearly identified all DMP's with permanent easily readable letters and numbers as approved by the Engineer.

3. Utility Monitoring Points (UMPs)
   a. Utility monitoring points (UMPs) will be used to monitor vertical and horizontal deformation of selected utilities and underground structures as specified herein.
   b. UMP shall include, at a minimum, the following:
      1) 3-1/2 inch extra strong steel pipe sleeve and 1-inch extra strong steel riser pipe, threaded and coupled, ASTM A 53/A 53M Grade B;
      2) PVC centralizers, consist of a schedule 40 PVC pipe conforming to ASTM D1785, sized to provide a tight fit on the riser pipe, and spring-formed to a larger diameter to provide a loose fit in the sleeve pipe
   c. UMPs shall be installed to top of utility or underground structure by vacuum excavation method. The monitoring rod with centralizers shall set on top of the utility or underground structure and extending to within 1 foot of the ground surface. The utility monitoring point shall be installed with a flush mount roadbox casing at grade and shall be clearly identified by surface marking

4. Excavation Support Monitoring Points (ESMPs)
   a. ESMPs shall be fixed markers on the vertical elements of the excavation support system and shall be used to monitor horizontal deformation of excavation support system designed by the Contractor. Clearly identified all points with permanent easily readable letters and numbers as approved by the Engineer. Surface within 3 inches of each point shall be cleaned and clearly identified using fluorescent spray paint adjacent to the point.

B. Non-Shrink Cement Grout shall be suitable for intended application.

2.04 SEISMOGRAPHS

A. Provide portable seismographs for monitoring the velocities of ground vibrations resulting from construction activities as specified herein. Provide for full-time use on the project during vibration causing construction activities. Provide two (minimum) seismographs which have been calibrated within the previous six months to a standard that is traceable to the National Institute of Standards and Technology. Required characteristics of seismographs are listed below:

1. Measure the three mutually perpendicular components of particle velocity in directions vertical, radial, and perpendicular to the vibration source.

2. Measure and display the maximum peak particle velocity continuously during vibration-generating activities.

3. Have a low frequency omnidirectional transducer for measuring air blast overpressure with a flat frequency response within the limits of 2 Hz to 250 Hz with a tolerance equal to or better than plus or minus 10 percent.

4. Seismic range: 0.01 to 4 inches per second with an accuracy of plus or minus 5 percent of the measured peak particle velocity or better at frequencies between 10 Hertz and 100 Hertz, and with a resolution of 0.01 inches per second or less.

5. Acoustic range: 110 to 140 dB (referenced to 20 micro-Pascals) with an accuracy and resolution of plus or minus 1 dB.

6. Frequency response (plus or minus 3 dB points): 2 to 200 Hertz.

7. Two power sources: internal rechargeable battery and charger and 115 volts AC. Battery must be capable of supplying power to monitor vibrations continuously for up to 24 hours.

8. Self-triggering wave form capture mode that provides the following information: plot of wave forms, peak particle velocities, peak overpressure, frequencies of peaks.

9. Continuous monitoring mode must be capable of recording single-component peak particle velocities, and frequency of peaks with an interval of 1 minute or less.

2.05 CRACK MONITORS

A. Provide crack gages for monitoring the width of existing cracks and joints as manufactured by Geokon, Inc., Lebanon, NH Model 4420, or equal.

B. Crack gages shall have threaded anchors with ball joints which can be grouted to each side of the crack in any orientation and a transducer with a range of at least 1 inch and an accuracy of less than 0.1 percent and a nonlinearity of no more than 0.5 percent. The gage shall be capable of operating in temperatures ranging from minus 20 degrees to 80 degrees (Celsius).

C. Provide a solid steel cover over each gage which does not touch or otherwise interfere with the operation of the gage.

PART 3 EXECUTION

3.01 PREPARATION

A. Prior to commencing any installation of excavation support, excavation for both open trench and trenchless crossings] , and pile installation and dewatering work, furnish components of instrumentation that are to be installed during construction and conduct pre-construction surveys.

B. Install instruments.

C. Protect from damage and maintain instruments installed by the Contractor.

D. Repair or replace damaged instruments furnished by the Contractor.

E. Collect, reduce, process, plot and report monitoring data obtained by survey, seismograph data, groundwater levels, and submit to the Engineer.

F. Coordinate with the Engineer to verify consistency of collected data.

G. Implement remedial measures based on interpretations of monitoring data program.

3.02 GENERAL REQUIREMENTS

A. Perform a pre-construction survey prior to any dewatering, excavation, trenchless crossings, installation of piles or installation of excavation support.

B. Install instruments at locations selected by the Contractor and approved by the Engineer in accordance with the approved installation procedures. The Engineer may modify instrument locations depending on field conditions and monitoring objectives. Install all instrumentation in accordance with the approved installation schedule. Instruments shall be installed and baseline data, acceptable to the Engineer, shall be obtained before construction starts.

C. Provide the Engineer with access to instrument locations and assistance required in obtaining monitoring data.

D. All instruments shall be clearly marked, labeled, and protected to avoid being obstructed or otherwise damaged by construction operations or the general public. Immediately following installation, the location of the top of all instruments shall be surveyed to provide horizontal and vertical coordinates. Resurveying shall be done as required by the Engineer if there is a question regarding the instrumentation location.

E. A unique instrument identification number shall be assigned to each instrument and each point. The instrument identification number shall be clearly marked on each instrument in a non-destructible manner.

F. Initial Reading: Immediately following instrument installation, the Contractor, in the presence of the Engineer, shall take two sets of initial readings to provide baseline readings and to demonstrate the adequacy of the completed installation.

G. Factory Calibration: A factory calibration shall be conducted on all instruments at the manufacturer's facility prior to shipment. Each factory calibration shall include a calibration curve with data points clearly indicated, and a tabulation of the data. Each instrument shall be marked with a unique identification number.

H. The instrumentation and monitoring specified here is considered the minimum required. The Contractor shall obtain additional data from the instrumentation and /or furnish, install, and monitor additional instrumentation as necessary to adequately monitor construction performance and safety aspects of the work.

3.03 MONITORING POINTS

A. Monitoring Points shall include but not be limited to SMPs, DMPs, UMPs and ESMPs. Monitor these control points using surveying methods.

B. Install SMPs, UMPs and DMPs as described below near excavations, pile installation locations, trenchless crossings, and open trench locations. Additional SMPs, UMPs, and DMPs may be required by the Engineer.

C. SMPs shall also be installed in the pavement or ground surface, within 5 feet, along each side of trench excavations that is within 50 feet of structures. The SMPs shall be installed at spacing not more than 50 feet. Locations may be modified to meet site constraints with the approval of the Engineer.

D. SMPs shall also be installed on the rim of manhole covers of utilities located within 50 feet of trenchless crossings or within 30 ft of open excavations.

E. Along trenchless crossing alignments, SMPs shall be installed at intervals of not more than 10 feet over the proposed trenchless crossing locations in rows of three; one directly above the alignment and the other two located 10 feet apart on each side oriented perpendicular to the pipe alignment. Locations may be modified to meet site constraints with the approval of the Engineer.

F. DMPs:

1. DMPs shall be installed on the exterior walls of buildings or structures located within 30 ft of open excavations or 50 feet of shafts or trenchless crossing alignments. As much as practical, DMPs shall be installed on supporting walls or columns. Avoid installation in brick unless absolutely necessary.

2. As a minimum, DMPs shall be installed on the exterior wall corners of buildings, structures, or property boundary walls at not more than 50 feet spacing. The Engineer may require additional DMPs be installed to monitor building movement at other locations.

3. Install DMPs in cooperation with property owners so that installations are inconspicuous and acceptable to the property owners. Existing features of building foundations that are permanent and can be repeatedly surveyed may substituted for DMPs, if approved by the Engineer.

G. UMPs shall be installed on existing utility over 36 inch in diameter and located within 15 feet from excavation. UMPs shall be located at a spacing of not more than 50 feet.

H. ESMPs shall be installed on excavation support systems other than trench box along support walls at spacing not more than 25 feet.

I. Install and obtain SMP, UMP, and DMP monitoring point readings prior to installing excavation support, beginning excavation or operation of groundwater control system, start of pile installation, or start of installation of excavation support at the site. Install ESMPs prior to excavation within the exaction support system. The Contractor shall obtain two sets of measurements for each monitoring point to establish the baseline data within three days of installation. These measurements shall be made at least 24 hours apart but not more than 48 hours apart. Monitoring points with initial surveyed elevations (or offsets as appropriate) differing by more than 2 mm shall be checked for secure installation and resurveyed.

J. The reading schedule of all SMPs, UMPs and DMPs surveyed shall be daily during excavation, dewatering, filling and backfilling, pile installation, trenchless excavation and excavation support installation by all methods within 50 feet of the work and then at least twice a week until all excavation, dewatering and backfill has been completed.

K. Survey of SMPs, UMPs and DMPs for trenchless crossing operation shall include once per day starting at least two days prior to the start of trenchless excavations and extend at least 30 days after the completion of the crossing.

L. The reading schedule of ESMPs shall be at least daily during associated excavation and twice a week until backfill is completed.

3.04 VIBRATION MONITORING

A. Seismograph readings shall be taken during pile installation and other ground vibrations including excavation support installation or other activities causing ground vibrations within 50 feet of existing structures to document that peak particle velocities do not exceed the limit criteria as described below.

B. Seismographs shall be installed by the Contractor near existing structures when vibratory or impact hammers are used for the installation of shoring within 50 feet of existing structures, and as directed by the Engineer. Seismograph locations shall include points on the ground surface between 3 and 6 feet from the faces of the nearest building(s). Seismographs shall be firmly mounted on the surface slab of concrete or asphalt or firmly set in undisturbed soils.

3.05 GROUNDWATER OBSERVATION WELLS

A. At least one monitoring well shall be installed on each side of trenchless crossing to 10 feet below the invert of the casing.

B. Existing wells may be used if appropriate and approved by the Engineer.

C. The screened interval of each well shall be set to monitor groundwater levels.

D. Using approved drilling methods, drill 4-in minimum diameter holes for observation wells of the size and depth required, and case with temporary casing. Bentonite drilling mud shall not be used in drilling holes for the observation wells.

E. Flush all cased holes with clean water through an approved bit. Flush until the discharge water is free of soil particles.

F. Construct observation well with 10 feet of slotted PVC well screen, filter sand, bentonite seal, couplings, a pipe cap, and a locking cover.

1. Place two feet of filter sand in the bottom of the drilled hole; then place the well screen and surround it with filter sand, as the temporary casing is carefully withdrawn.

2. Insert solid PVC casing and cap and fill the annular space with bentonite pellets then non-shrink cement grout.

3. Protect the observation wells at ground surface by providing a roadway box or outer protective casing with lockable top and padlock. Design the surface protection to prevent damage by vandalism or construction operations and to prevent surface water from infiltrating.
   a. Provide two keys for each padlock to the Engineer for access to each well.
   b. Observation wells shall be developed so as to provide a reliable indication of groundwater levels. Wells shall be re-developed if well clogging is observed, in the event of apparent erroneous readings, or as directed by the Engineer.
   c. Submit observation well installation logs, top of casing elevation, and well locations to the Engineer within 24 hours of completion of well installation.

G. Observation Well Maintenance

1. The Contractor shall maintain each observation well until adjacent structures, box culverts and pipelines are completed and backfilled. Clean out or replace any observation well which ceases to be operable before adjacent work is completed.

2. It is the Contractor's obligation to maintain observation wells and repair or replace them at no additional cost to the District, whether or not the observation wells are damaged by the Contractor's operations or by third parties.

H. Monitoring and Reporting of Observation Well Data

1. The Contractor shall begin daily monitoring of groundwater levels in work areas prior to initial operation of drainage and dewatering system. Daily monitoring in areas where groundwater control is in operation shall continue until the time that adjacent structures, box culverts and pipelines are completed and backfilled and until the time that groundwater control systems are turned off.

2. The Contractor is responsible for processing and reporting observation well data to the Engineer on a daily basis. Data is to be provided to the Engineer on a form, which should include the following information: observation well number, depth to groundwater, top of casing elevation, groundwater level elevation and date and time of reading.

I. Following construction, abandon new observation wells as directed by the Engineer. Abandon observation wells by removing all material within the original borehole, including the casing, filter, and grout seal in accordance with all applicable permits. Using approved tremie methods completely fill the hole and all voids with non-shrink cement grout prior to removal of the drill casing such that formation materials do not move into the hole prior to grouting. Restore the ground surface to its original condition. Abandon wells within paved areas by removing the vaults and well caps to the pavement subgrade. Remove wells with as discussed above and repair or patch pavement with the same surface type.

3.06 INSTRUMENT PROTECTION, MAINTENANCE AND REPAIR

A. Protect the instruments from damage. The Contractor shall immediately replace, within 72 hours of damage, any instrument that becomes damaged or is destroyed for whatever reason at no additional cost to the District. If necessary, the contractor will suspend work in the areas being monitored by the damaged instrument and take remedial action.

B. Maintain the instruments by draining water and flushing debris from under protective covers and keeping covers locked and sealed at all times.

3.07 MONITORING

A. The Contractor shall collect, tabulate, plot and interpret the survey monitoring data and provide the Engineer with the tabulated and plotted data. Report the status of excavation, bracing, groundwater levels, pile installation operation, stationing of the trenchless casing face/leading edge, and backfilling at the time of data collection with each report.

B. Monitoring frequency may be modified as directed and approved by the Engineer.

C. Provide data from readings of all monitoring points to the Engineer within 24 hours of reading. Communicate verbally with the Engineer immediately after visual observations or data collection if excessive movements or other anomalies are indicated.

D. For seismograph data, a summary report with event summary of peak particle velocity and frequency shall be provided. A strip chart indicates the time and magnitude of maximum single-component peak particle velocity measured during each 5-minute interval of the monitoring period shall be submitted. A summary of vibration producing activities for that week shall be listed along with any specific events which caused anomalous readings.

E. The Contractor shall make visual observations of ground conditions and building conditions in the vicinity of the site and communicate immediately with the Engineer if signs of ground or building movements are observed.

F. The Engineer may take independent instrumentation measurements. Cooperate with the Engineer during instrumentation monitoring by providing access to the instrumentation locations in a timely manner and by providing and maintaining safe means of access to all instrumentation locations for data collection. Data acquired by the Engineer will be made available to the Contractor in a timely manner.

G. The Contractor may make his/her own interpretations of monitoring data for his/her own purposes. Data or interpretations shall not be published of disclosed to other parties without advance written permission of the District.

H. If the Contractor collects data from an instrument that has been installed to replace a damaged instrument, the formal initial reading for the damaged instrument shall be used as an initial reading for the replacement instrument so that data are plotted continuously, without an offset at the time of damage. The time of damage and replacement shall be noted on the plot.

3.08 INTERPRETATION AND RESPONSE VALUES

A. The Contractor shall make its own interpretations of the data resulting from monitoring programs.

B. Threshold and Limiting Values for instruments:

Instrument	Threshold Value	Limiting Value
Seismographs	1.0 in/sec over 40 Hz 0.75 in/sec at 30- 40 Hz 0.5 in/sec at 20-30 Hz 0.25 in/sec under 20 Hz	2.0 in/sec over 40 Hz 1.5 in/sec at 30- 40 Hz 1.0 in/sec at 20-30 Hz 0.5 in/sec under 20 Hz
Surface Monitoring Points	0.5 inch	1.0 inch
Deformation Monitoring Points	0.25 inch	0.5 inch
Utility Monitoring Points	0.25 inch	0.5 inch
Excavation Support Monitoring Points	1.0 inch	2 inches
Observation Wells	2 ft below bottom of excavation (including shafts)	at bottom of excavation
Observation Wells	1 ft below bottom of casing for trenchless crossing	at bottom of casing for trenchless crossing

C. These values are subject to adjustment by the Engineer as indicated by prevailing conditions and/or circumstances.

D. If a Threshold Value is reached:

1. Engineer and Contractor shall meet to discuss remedial measures.

2. Contractor shall increase the instrument monitoring frequency as directed by the Engineer.

3. Contractor shall install and monitor additional instruments as directed.

4. Contractor shall implement the remedial measures in the event the Threshold Value is reached, so the Limiting Value is not reached.

E. Contractor to take all necessary steps so that the Limiting Value is not exceeded. Contractor may be directed to suspend activities in the affected area with the exception of those actions necessary to avoid exceeding the Limiting Value.

3.09 DISPOSITION OF INSTRUMENTS

A. Monitoring Points and Crack Gages: All monitoring points and crack gages shall be removed during the cleanup and restoration work, unless directed otherwise by the Engineer.

B. Utility Monitoring Points: When required by the Engineer, abandon and remove protective housings and caps in accordance with the required permits. All surfaces affected by installation of instruments shall be restored to their original condition prior to completion of work.

1. Leave in place any casings located within the plan limits of structures or pipelines or within the zone below 1H:1V planes extending downward and out from the edges of foundation elements or from the downward vertical footprint of the pipe, or where removal would otherwise result in ground movements causing adverse settlement to adjacent ground surface, utilities or existing structures.

2. Where casings are pulled, holes shall be filled with sand. Where left in place, casings should be filled with non-shrink cement grout and cut off a minimum of 3-ft below finished ground level or 1-ft below foundation level so as not to interfere with finished structures or pipelines.

3. Remove precast boxes or vaults and reconstruct pavement in paved areas. Restore surface to the conditions existing prior to installation of the instruments.

C. Seismographs: Units shall be returned to the Contractor following completion of the installation of excavation support and excavation.

END OF SECTION

SECTION 02616
DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, material, equipment and incidentals required, install, and test ductile iron pipe and fittings as shown on the drawings and as specified herein.

B. Piping shall be located substantially as shown on the Drawings. The Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference between pipes, conduits, utilities or for other reasons. Pipe fitting notation is for the Contractor's convenience and does not relieve him/her from installing and jointing different or additional items where required to achieve a complete piping system.

C. Where the word "pipe" is used it shall refer to pipe, fittings, or appurtenances unless otherwise noted.

1.02 RELATED WORK

A. Dewatering and drainage is included in section 02140.

B. Excavation, Bedding and Backfilling for Pipe is included in Section 02221.

C. Valves and Appurtenances are included in Section 15100.

1.03 SUBMITTALS

A. Submit, in accordance with Division 1 Specifications the name of the pipe and fitting manufacturers and a list of materials to be furnished by each manufacturer. Also, include information on local representative for each manufacturer, if product is sold through a distributor.

B. Shop Drawings including piping layouts and schedules shall include dimensioning, fittings, types and locations of valves and appurtenances, joint details, methods and location of supports, anchorage, gasket material, grade of material and all other pertinent technical information for all items to be furnished.

C. Prior to each shipment of pipe, certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein shall be submitted.

D. Submit anticipated production and delivery schedule.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.

2. ASTM A194 - Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High-Pressure and High-Temperature Service.

3. ASTM C150 - Standard Specification for Portland Cement.

B. American Water Works Association (AWWA)

1. AWWA C104 - Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.

2. AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3-In Through 48-In for Water and Other Liquids.

3. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

4. AWWA C150 - Thickness Design of Ductile-Iron Pipe.

5. AWWA C151 - Ductile-Iron Pipe, Centrifugally Cast, for Water or Other Liquids.

6. AWWA C153 - Ductile- Iron Compact Fittings, 3-In Through 16-In for Water and Other Liquids.

7. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Each length of ductile iron pipe supplied for the project shall be hydrostatically tested at the point of manufacture to 500 psi for a duration of 10 seconds per AWWA C151. Testing may be performed prior to machining bell and spigot. Failure of ductile iron pipe shall be defined as any rupture of the pipe wall. Certified test results shall be furnished in duplicate to the Engineer prior to time of shipment.

B. All ductile-iron pipe and fittings to be installed under this project shall be inspected and tested at the foundry as required by the standard specifications to which the material is manufactured. Furnish in duplicate to the Engineer sworn certificates of such tests and their results prior to the shipment of the pipe.

C. All 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 District at the District's expense.

D. Inspection of the pipe and fittings will also be made by the Engineer or representative of the District 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. All pipe and fittings shall be permanently marked with the following information:

1. Manufacturer, date.

2. Size, type, class, or wall thickness.

3. Standard produced to (AWWA, ASTM, etc).

1.06 DELIVERY, STORAGE AND HANDLING

A. Care shall be taken in loading, transporting, and unloading to prevent injury 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.

B. Materials, if stored, shall be kept safe from damage. The interior of all piping, fittings and other appurtenances shall be kept free from dirt or foreign matter at all times.

C. 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.

D. Gaskets for mechanical and push-on joints to be stored 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.

PART 2 PRODUCTS

2.01 DUCTILE IRON PIPE, FITTINGS AND ACCESSORIES

A. Pipe

1. Ductile iron pipe shall conform to AWWA C151 and ANSI A21.51. Pipe shall be supplied in standard lengths as much as possible.

2. Thickness design shall be per AWWA C150, except provide minimum Class 350 for piping 12-in and smaller and pipe shall be minimum Class 250 for larger than 12-in.

3. Ductile iron pipe shall be by U.S. Pipe and Foundry Company, Inc.; American Cast Iron Pipe Company or equal. All pipe shall be made in the United States and supplied by a single manufacturer.

B. Joints

1. Ductile iron pipe shall have rubber-gasket push-on joint, rubber-gasket mechanical joint, or flanged joints as shown on the Drawings. Rubber-gasket joints shall conform to AWWA C111. Gasket shall conform to AWWA C111 and ANSI A21.1 and shall be Buna N, Neoprene or Nytryl-based rubber product approved by the Engineer.

2. Restrained joints shall be suitable for the specified pipe test pressure. The required lengths of restrained joints for the transmission main shall be as shown on the Drawings. All restraint systems shall have factory applied liquid thermoset epoxy coating.
   a. Joint restraint devices for ductile iron mechanical join pipe and ductile iron mechanical joint fittings or ductile iron pipe shall be EBAA Iron Sales Series 1100 Megalug ®, Uniflange, Romac Industries, Sigma, Lok-Type or TR-Flex or HDSS

manufactured by US Pipe Co., Lok-Fast or Lok-Ring manufactured by American Cast Iron Pipe Co., or Star Restraint;

b. Bell joint restraint device for ductile iron push joint pipe shall be EBAA Iron Inc. Series 1700 Megalug ® for bell restraint;

c. Restrained push-on joints for push joint pipe shall be US Pipe and Foundry TR Flex or HDSS, American Cast Iron Pipe Company, or Flex Ring.

3. Flanged joints shall be as specified below.

4. Bolts and nuts on mechanical joint or flange joint pipe and fittings or restraint devices shall be 304 stainless steel conforming to ANSI B16.1.

C. Fittings

1. Pipe fittings shall be ductile iron with pressure rating of 350 psi for 24-in and smaller piping and 250 psi for 30-in and larger piping. Fittings shall meet the requirements of AWWA C110 or AWWA C153 as applicable. Fittings shall have the same pressure rating, as a minimum, of the connecting pipe. Fittings may be made outside the United States, but shall be supplied by one of the named pipe manufacturers or Engineer approved equal.

2. Closures shall be made with mechanical joint ductile iron solid sleeves and shall be located in straight runs of pipe. Location of closures shall be subject to approval of the Engineer.

D. Interior Lining

1. All ductile iron pipe shall contain seal coated cement mortar lining conforming to the requirements of ANSI/AWWA C151 and C104. Cement for mortar lining shall be Type II or V. A fly ash or pozzolan shall not be used. Ductile iron fittings shall be double cement lined, seal coated inside and outside with an asphaltic material in accordance with AWWA C104 specified.

2. Interior surfaces of all ductile iron pipe shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C104. Ductile iron fittings shall be double cement lined. Ductile iron pipe fittings need not have the cement-mortar lining applied centrifugally. The lining machines shall be of the type that has been used successfully for similar work. At the option of the supplier, fittings may be lined in accordance with AWWA C550. Every precaution shall be taken to prevent damage to the lining. If the lining is damaged or found faulty at the delivery site, the damaged or unsatisfactory portion shall be repaired in the field in accordance the ANSI/AWWA C104.

3. All shop-applied cement mortar lining shall be given a seal coat of asphaltic material in conformance with NSI/AWWA C104.

E. Exterior Coating

1. Buried pipe shall be coated on the exterior with a 1.0 mils thick bituminous coat in accordance with ANSI A21-51. All buried ductile iron pipe shall have a polyethylene wrap with a minimum 8 mils thickness and shall conform to ASTM specification D-1248. Wrap for raw water transmission main shall be green and imprinted “RAW WATER MAIN”. When imprinted color coated polyethylene wrap is not available, color-coded polyethylene wrap can be used in conjunction with pipe ID tape.

F. Flanged Pipe, Fittings, and Appurtenances

1. Flanged pipe shall conform to AWWA C111 and AWWA C151 and shall be Special Thickness Class 53 minimum.

2. Flanged ductile iron fittings shall conform to AWWA C1110 and AWWA C111 and shall have a pressure rating of 250 psi minimum.

3. Flanges shall be ductile iron and shall be faced and drilled per ANSI/AWWA C110/A21.10 and ANSI B161.1 Class 125.

4. Pipe and fittings shall be furnished with gaskets, bolts, and nuts in a sufficient quantity for assembly of each flanged joint.

5. Gaskets shall be full face EPDM in accordance with AWWA C110.

6. Bolts, washers, and nuts shall be 316 SS conforming to ANSI/AWWA C110/A21.10 and ASTM A307. Bolts and nuts shall have heavy hex heads.

7. Flanged pipe and fittings shall have cement mortar interior lining and seal coat (NSF 61 rated) per ANSI/AWWA C104/A21.4 Flanged pipe and fittings shall be furnished with manufacturer's standard primer.

8. All buried ductile iron pipe and fittings shall have a polyethylene wrap with a minimum 8 mils thickness and shall conform to ASTM specifications D-1248. Wrap for raw water main shall be olive green and imprinted "RAW WATER MAIN".

G. Harnessed Flanged Adaptor Couplings

1. Harnessed flanged adapter couplings, where shown on the Drawings shall be furnished by the Contractor. Flange adapter couplings shall be as specified below and in the piping materials sections of these specifications.

2. Flanged coupling adaptors shall be Smith-Blair Type 913 with Type 907 Restraint Plates and Rods, Dresser Style 128-W with Style 441 Tie Plates and Rods, or equal conforming to AWWA Manual M11. Tie rods and nuts shall be in accordance with AWWA Manual M11. Anchor studs will not be permitted.

3. All couplings shall be furnished with the pipe stop removed.

4. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

5. All couplings shall have a sufficient number of factory installed anchor studs to meet or exceed the test pressure rating for this project.

6. Harness rods and bolts shall be low alloy high-strength carbon steel and shall be furnished by flange adaptor coupling Manufacturer. Size and number of harness rods shall be determined by manufacturer based on maximum pressure of 250 psi.

7. Interior and exterior ferrous metal surfaces shall have a factory applied epoxy coating.

2.02 DUCTILE IRON PIPE DESIGN

A. Ductile iron pipe shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Design shall be done for external and internal pressures separately using the larger of the two for the net design thickness. Additional allowances shall be made for service allowance and casting tolerance per AWWA C150. The pipe classes determined for various sizes and conditions shall provide the total calculated thickness at a minimum or conform to minimum pipe class specified in Paragraph 2.01A2 above, whichever is greater.

B. Design for the net thickness for external loading shall be taken as the greater of the following conditions:

1. 2-1/2-ft of cover with AASHTO H-20 wheel loads, with an impact factor of 1.5.

2. Depth from existing ground level of future proposed grade (whichever is greater) to top of pipe as shown on the Drawings, with truck load.

3. Soil Density: 120 lbs/cu ft.

4. Laying Conditions; AWWA C150, Type 2.

C. Design for the net thickness shall be based upon the following design internal pressure conditions:

1. Total internal Pressure design:	500 psi (includes 100 psi surge allowance and 2.0 safety factor)
2. Soil Modulus E.:	300 psi

D. Copies of design calculations showing that the pipe meets all requirements specified herein shall be furnished to the Engineer for approval during shop drawing review in accordance with Section 01300. A yield strength of 42,000 psi shall be used during design calculations

PART 3 EXECUTION

3.01 GENERAL

A. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe or coatings. Pipe and fittings shall not be dropped. All pipe and fittings shall be examined before laying and no piece shall be installed which is found to be defective. Damage to the pipe coatings shall be repaired per Manufacturer's recommendations.

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.

3.02 INSTALLING DUCTILE IRON PIPE AND FITTINGS

A. Ductile iron pipe and fittings shall be installed in accordance with requirements of AWWA C600, Section 02221, and as specified herein. A firm, even bearing throughout the length of the

pipe shall be provided by digging bell holes at each joint and by tamping backfill materials at the side of the pipe to the springline per details shown on the Drawings. Blocking will not be permitted.

B. All pipe shall be sound and clean before laying. When laying is not in progress, open ends of the pipe shall be closed by a watertight plug or other approved means. Sufficient backfill shall be placed to prevent flotation. The deflection at joints shall not exceed 75 percent of allowable deflection recommended by Manufacturer.

C. All ductile iron pipe laid underground shall have a minimum of three feet of cover unless otherwise shown on the Drawings or as specified herein.

D. Fittings, in addition to those shown on the Drawings shall be provided, where required, in crossing utilities which may be encountered upon opening the trench. Solid sleeve closures shall be installed at locations approved by the Engineer.

E. The pipe interior shall be maintained dry and broom clean throughout the construction period.

F. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be used with a bell shall be beveled to conform to the manufactured spigot end. Cement lining shall be undamaged. Field cut ends shall be sealed with approved epoxy in accordance with Manufacturer's instructions.

G. Jointing Ductile-Iron Pipe

1. All pipe joints shall be made in strict accordance with Manufacturer's instructions and AWWA C600.

2. Mechanical joints shall be assembled with bell ends looking ahead. To assemble the joints in the field, thoroughly clean and lubricate the joint surfaces and rubber gasket. Bolts shall be tightened to the specified torques. Under no condition shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

3. Bolts shall be tightened alternately and evenly.

4. Joint restraints shall be installed according to pipe Manufacturer's instructions.

H. All blow-offs, outlets, valves, fittings, and other appurtenances required shall be set and jointed as indicated on the Drawings in accordance with the Manufacturer's instructions.

I. All polyethylene encasement shall be installed per AWWA C105.

3.03 IDENTIFICATION

A. All buried ductile iron pipe shall be color-coded with a field-applied continuous painted stripe (minimum 2-inch wide) running along the crown of the pipe.

B. Color shall be as follows:

1. Raw Water – Olive Green

3.04 TESTING

A. After installation, the pipe shall be tested for compliance as specified herein. Furnish all necessary equipment and labor for the pressure test and leakage test on the pipelines.

B. Submit detailed test procedures and method for Engineer's review. In general, testing shall be conducted in accordance with AWWA C600.

C. New piping shall be subjected to a hydrostatic pressure of 200 psi. This test pressure shall be maintained for a minimum of two hours. The leakage rate shall not exceed those indicated in AWWA C600. Provide suitable restrained bulkheads or blind flanges as required to complete the hydrostatic testing specified.

D. All valves and valve boxes 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.

E. Hydrostatic pressure and leakage tests shall conform with Section 4 of AWWA C600. Furnish gauges, meters, pressure pumps and other equipment needed to fill the line slowly and perform the required hydrostatic pressure leakage tests.

F. 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 a pump furnished by the Contractor. 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.

G. Submit plan for testing to the Engineer for review at least 10 days before starting the test.

3.05 CLEANING

A. During the course of the work, keep the pipeline clean from dirt, stones, pieces of wood, or other material. All debris shall be removed from the pipeline. At the conclusion of the work the Contractor shall thoroughly clean all of the new pipelines by pigging to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed. Provide hoses, temporary pipes, ditches, etc., as required to dispose of flushing water without damage to adjacent properties.

3.06 FIELD PAINTING

A. All flanged ductile iron pipe and fittings shall be field painted by Contractor per Section 09902.

B. Flanged pipe and fittings to be located below grade shall be field painted prior to installation.

3.07 THREADED TAPS

A. Contractor shall be responsible for installing the threaded taps where shown on the drawing or required for testing. The threaded taps shall conform to ANSI/ASME B1.20.1.

END OF SECTION

SECTION 02622
POLYVINYL CHLORIDE (PVC) PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to install and test polyvinyl chloride (PVC) pipe and fittings, complete as shown on the Drawings and as specified herein.

B. Pipe or piping refers to all pipe, fittings, material and appurtenances required to construct PVC pipe complete, in place.

1.02 RELATED WORK

A. Dewatering and drainage is included in section 02140.

B. Excavation, backfilling and compacting is included in Section 02221.

C. Valves and Appurtenances are included in Section 15100.

D. Surface Preparation and Shop Prime Painting in Section 09901 and Finish Painting in Section 09902.

1.03 SUBMITTALS

A. Submit, in accordance with Division 1 Specifications the name of the pipe and fitting manufacturers and a list of materials to be furnished by each manufacturer. Also, include information on local representative for each manufacturer, if product is sold through a distributor.

B. Shop Drawings including piping layouts and schedules shall include dimensioning, fittings, types and locations of valves and appurtenances, joint details, methods and location of supports, anchorage, gasket material, grade of material and all other pertinent technical information for all items to be furnished.

C. Prior to each shipment of pipe, certified test reports that the pipe for this Contract was manufactured and tested in accordance with the ASTM Standards specified herein shall be submitted.

D. Submit anticipated production and delivery schedule.

1.04 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 F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe.

3. ASTM F1760 – Standard Specification for Co-extruded Poly (Vinyl Chloride) (PVC) Non-Pressure Plastic Pipe Having Reprocessed-Recycled Content.

4. ASTM D2241 - Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series).

B. National Sanitation Foundation (NSF)

1. Standard No. 14 - Plastic Piping Components and Related Materials.

C. American Water Works Association (AWWA)

1. AWWA C110 - Ductile-Iron and Gray-Iron Fittings, 3-in Through 48-in (75mm Through 1219mm) for Water.

2. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

3. AWWA C600 - Installation of Ductile-Iron Water Mains and Their Appurtenances.

4. AWWA C-605 -– Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water.

5. AWWA C651 - Disinfecting Water Mains.

6. AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-in through 60-in (100 mm Through 1,500 mm).

7. AWWA M-23 -– Manual of Water Supply Practices PVC Pipe, Design and Installation.

D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. All PVC pipe and fittings of a similar type (e.g. solid wall or profile wall) shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in ASTM D3034 as applicable.

B. Inspections of the pipe may also be made by the Engineer or other representatives of the District 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 at once.

1.06 SYSTEM DESCRIPTION

A. Contractor is responsible for compatibility between pipe materials, fittings and appurtenances.

1.07 DELIVERY, STORAGE AND HANDLING

A. All items shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the Engineer.

B. PVC items deteriorate in sunlight and are slightly brittle, especially at lower temperatures, so care shall be taken in loading, transporting and unloading items to prevent injury to the items. All items shall be examined before installation and no piece shall be installed which is found to be defective. Handling and installation of pipe and fittings shall be in accordance with the manufacturer's instructions, referenced standards and as specified herein.

C. Any pipe or fitting showing a crack or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work.

D. While stored, pipe shall be adequately supported from below at not more than three foot intervals to prevent deformation. Pipe shall not be stacked higher than six feet. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature buildup when exposed to direct sunlight will not be permitted. Pipe covering shall be in conformance with the Manufacturer's recommendations.

E. Pipe and fittings shall be stored in a manner which will keep them at ambient outdoor temperatures and out of the sunlight or delivered to the site so that no pipe is exposed to sunlight for more than 60 days. Temporary shading as required to meet this requirement shall be provided. Simple covering of the pipe and fittings which allows temperature buildup or direct or indirect sunlight will not be permitted.

F. If any defective item is discovered after it has been installed, it shall be removed and replaced with an exact replacement item in a satisfactory manner by the Contractor, at the Contractor's own expense. All pipe and fittings shall be thoroughly cleaned before installation and the interior shall be kept clean until testing.

G. In handling the items, use special devices and methods as required to achieve the results specified herein. No uncushioned devices shall be used in handling the item.

1.08 PROJECT/SITE REQUIREMENTS

A. PVC pipe shall be stored in the right of way as to not disturb the flow of traffic or to block driveway or sidewalk access.

PART 2 PRODUCTS

2.01 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. Polyvinyl Chloride (PVC) Pipe:

1. PVC pipe and accessories four to 60 inches in diameter, where shown on the Drawings or as specified, shall meet the requirements of AWWA Specification C-900 "Polyvinyl Chloride (PVC) Pressure Pipe". Pipe shall be Class 150, meeting requirements of

Dimension Ratio (DR) 18 and shall be designed with ductile iron outside diameters and for a test pressure of 200 psi. Each length of pipe shall be hydrotested to four times its class pressure by the Manufacturer in accordance with AWWA C 900. Pipe shall be listed by Underwriters Laboratories. Provisions shall be made for expansion and contraction at each joint with an elastomeric ring and shall have an integral thickened bell as part of each joint. PVC Class pipe shall be installed in accordance with the Uni-Bell Plastic Pipe Association Guide Specification UNI-B-3-76, and as recommended by the Manufacturer. Pipe shall be furnished in nominal lengths of approximately 20 feet, unless otherwise approved by the Engineer. Pipe and accessories shall bear the NSF mark indicating pipe size, Manufacturer's name, AWWA and/or ASTM Specification number, working pressure, and production code. Pipe shall be made from Class 12454-A or Class 12454-B virgin compound, as designed in ASTM D 1784.

2. PVC joints for pipe three inches in diameter or less, shall be threaded or solvent welded joints where called for on the Drawings, unless otherwise approved by the Engineer. Teflon thread tape or liquid teflon thread lubricant shall be used on all threaded joints to serve as both a sealer and lubricant. Threaded joints should be made hand tight (hard). When the joint is hand tight a strap wrench should be used to make up one to two additional full turns past the hand tight point. Do not use pipe wrenches or pump pliers on plastic pipe or fittings.

B. Joints:

1. The PVC line joints for below ground piping three to 30 inches in diameter shall be of the push-on type approved by the Engineer so that the pipe and fittings may be connected on the job without the use of solvent cement or any special equipment. The push-on joint shall be a single rubber gasket joint designed to be assembled by the positioning of a continuous, molded rubber ring gasket in annular recess in the pipe and the forcing of the plain end of the entering pipe into the socket, thereby compressing the gasket radially to the pipe to form a positive seal. The gasket and annular recess shall be designed and shaped so that the gasket is locked in place against displacement as the joint is assembled. The rubber ring joint shall be designed for thermal expansion or contraction with a total temperature change of at least 75^{o}F in each joint per length of pipe. The bell shall consist of an integral wall section with a solid cross section elastomeric ring which shall meet requirements of ASTM D 1869. The thickened bell section shall be designed to be at least as strong as the pipe wall. Lubricant furnished for lubricating joints shall be nontoxic, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to the water and shall be approved by the Manufacturer.

C. Fittings:

1. All fittings for pressure mains for below ground piping of four to 30 inches in diameter shall be ductile iron with mechanical joints and shall conform to AWWA/ANSI specifications C110/A21.10 for ductile iron fittings and Section 02616, unless otherwise shown on the drawings or approved by the Engineer.

2. Fittings for PVC pipe three inches in diameter or less, shall be threaded or solvent weld and be PVC as shown on the Drawings, or as approved by the Engineer. Threaded PVC fittings shall conform to ASTM Specification D 2464.

3. The Manufacturer of the pipe shall supply all polyvinyl chloride accessories as well as any adaptors and/or specials required to perform the work as shown on the drawings and specified herein. Standard double bell couplings will not be accepted where the pipe will slip completely through the coupling.

D. Restrained Joints:

1. The required lengths of restrained joints for the transmission main shall be as shown on the Drawings. Restraint for PVC water mains shall be EBAA Iron, Inc., Megalug Retainer Glands, Series 1600 and 2000 PV (4-inch through 12-inch sizes) and Series 2800 and 2000 PV (14-inch through 36-inch sizes) or equal. All restraint systems shall have factory applied liquid thermoset epoxy coating. All bolts and nuts for restrained joints shall be 304 SS. After installation, apply a heavy bitumastic coating to all bolts, nuts and accessories.

E. All buried ductile iron fittings and restrained joints shall have a polyethylene wrap with a minimum 8 mils thickness and shall conform to ASTM specifications D-1248. Wrap for raw water main shall be olive green and imprinted "RAW WATER MAIN".

2.02 IDENTIFICATION

A. Each length of pipe and each fitting shall be marked with the name of the Manufacturer, size, and class. All gaskets shall be marked with the name of the Manufacturer, size, and proper insertion directions. A color sample of the PVC pipe and fittings shall be submitted to the Engineer for approval prior to fabrication of any pipe and accessories.

B. All buried PVC pipe shall be color-coded as follows:

1. Raw water – Olive Green Paint three stripes four inches in width.

C. Marking Tape shall be as specified and installed per Section 02221.

D. Electronic markers shall be installed 24 inches below final grade above pipe, at all bends or changes in alignment and every 100 feet along the pipeline between bends. Electronic markers shall be Omni Marker Electronic Marker by Greenlee or equal in green color.

PART 3 EXECUTION

3.01 INSTALLING POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

A. All raw water mains shall be installed in accordance with recommendations of the pipe Manufacturer and as specified herein.

B. Care shall be taken in the handling, storage, and installation of pipe and fittings to prevent injury to the pipe or coatings. All pipe and fittings shall be examined before installing, and no pipe shall be installed which is found to be defective. Pipe or fittings shall not be dropped. All damage to the pipe coatings shall be repaired according to the Manufacturer's recommendations.

C. All pipe and fittings shall be kept clean and shall be thoroughly cleaned before installation.

D. Pipe shall be laid to the lines and grades shown on the Drawings with bedding and backfill as shown on the Drawings and as specified in Section 02221. Blocking under the pipe will not be permitted.

E. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when laid, shall conform to the lines and grades required. Polyvinyl chloride pipe and fittings shall be installed in accordance with requirements of AWWA Standard Specification C600. 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 by Contractor, at his own expense.

F. When installation is not in progress, including lunchtime, or the potential exists for dirt of debris to enter the pipe, the open ends of the pipe shall be closed with watertight plugs or other approved means.

G. Under no circumstances shall the pipe or accessories be dropped into the trench.

H. All plugs, caps, bends and other locations where unbalanced forces exist shall be anchored by restrained joints.

I. In all cases where PVC pipe is installed, a detectable marking tape shall be located between 12 and 18 inches above the top of the pipe as specified in Section 02221.

J. When cutting pipe is required, the cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of pipe to be jointed with a bell shall be beveled to conform to the manufactured spigot end.

K. Maintain a minimum finish grade cover of 36-inches, unless otherwise approved by the Engineer or shown on the Drawings.

L. L. All polyethylene encasement shall be installed per AWWA C105.

3.02 JOINTING PVC PIPE

A. Push on joints shall be made in strict accordance with the manufacturer's instructions. Pipe shall be laid with bell ends looking ahead. A rubber gasket shall be inserted in the groove of the bell end of the pipe and the joint surfaces cleaned and lubricated. The plain end of the pipe to be entered shall then be inserted in alignment with the bell of the pipe to which it is to be joined and pushed home with a come-along or by other means. Check that the reference mark on the spigot end is flush with the end of the bell.

B. Mechanical joints shall be made in accordance with Appendix A of ANSI/AWWA C111 and the Manufacturer's instructions. Thoroughly clean and lubricate the joint surfaces and rubber gasket with soapy water before assembly. Bolts shall be tightened to the specified torques using a calibrated torque wrench. Under no conditions shall extension wrenches or pipe over handle of ordinary ratchet wrench be used to secure greater leverage.

3.03 RESTRAINED JOINTS

A. Restrained joints shall be installed for all pressure pipelines. The joint assemblies shall be made in accordance with the Manufacturer's recommendations. After installation, apply a heavy bitumastic coating to all bolts, nuts and accessories.

3.04 TESTING FOR PRESSURE MAINS

A. All pressure mains shall be field tested. Hydrostatic pressure and leakage tests shall conform with Section 4 of AWWA C600 Specification with the exception that the Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line.

B. The pressure required for the field hydrostatic pressure test shall be 200 psi . The Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure. Fill line slowly with water. Maintain flow velocity of less than 2.0 feet per second. Corporation cocks at least 2-inches in diameter, pipe riser and angle globe valves shall be provided at each pipe dead-end in order to bleed air from the line. Duration of pressure test shall be at least two hours. The cost of these items shall be included as a part of testing.

C. The amount of leakage which will be permitted shall be in accordance with AWWA C600 Standards for all pressure. No pipe installation shall be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD(P)^{1/2}}{133{,}200}$$

In which L is the allowable leakage in gallons per hour; S is the length of pipe tested, in feet; D is the nominal diameter of the pipe, in inches; and P is the average test pressure during the leakage test, in pounds per square inch gauge.

D. The Contractor must submit his plan for testing to the Engineer for review at least 10 days before starting the test. The Contractor shall remove and adequately dispose of all blocking material and equipment after completion and acceptance of the field hydrostatic test, unless otherwise approved by the Engineer. Any damage to the pipe coating shall be repaired by the Contractor. Lines shall be totally free and clean prior to final acceptance.

3.05 CLEANING

A. At the conclusion of the work the Contractor shall thoroughly clean all of the new pipelines by pigging to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed. Provide hoses, temporary pipes, ditches, etc., as required to dispose of flushing water without damage to adjacent properties.

B. After the pipelines are cleaned and if the groundwater level is above the pipe, or following a heavy rain, the Engineer will examine the pipe for leaks. If defective pipes or joints are discovered at this time, they shall be repaired or replaced by the Contractor.

END OF SECTION

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SECTION 02623
HIGH DENSITY POLYETHYLENE PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install high density polyethylene (HDPE) pipe and fittings complete, tested, and ready for use, as shown on the Drawings and as specified herein. HDPE pipe shall be ductile iron pipe size.

1.02 RELATED REQUIREMENTS

A. Testing and cleaning of pipe are included in Section 02622 and as specified herein.

B. Dewatering and drainage are included in Section 02140.

C. Excavation, backfilling and compaction are included in 02221.

D. Valves and appurtenances are included in Section 15100.

E. Horizontal Directional Drilling is specified in Section 02413.

1.03 SUBMITTALS

A. Submit, in accordance with 01300, completely detailed working drawings and schedules of all high-density polyethylene (HDPE) pipe and fittings required.

B. Submit the name and address of pipe manufacturer.

C. Submit complete description of method of pipe installation.

D. Submit description of the method of testing the pipe and fittings.

E. Submit the manufacturer’s recommendations for handling, storing and installing the pipe and fittings.

F. Submit certification that the stress regression testing has been performed on the specific polyethylene resin being utilized in the manufacturing of the pipe for this contract in accordance with ASTM D2837.

G. Prior to each shipment, submit certified test reports that the pipe and fittings for this contract were manufactured and tested in accordance with the ASTM Standards specified herein.

H. Submit the name and qualifications of the technicians proposed to perform the heat fusion of the pipe joints.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. ASTM A276 – Standard Specification for Stainless Steel Bars and Shapes.

2. ASTM A307 - Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.

3. ASTM D2321 - Standard Practice for Underground Installation of Thermoplastic Pipe for Sewer and Other Gravity-Flow Applications.

4. ASTM D2774 – Standard Practice for Underground Installation of Thermoplastic Pressure Piping.

5. ASTM D2657 - Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings.

6. ASTM D2837 - Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.

7. ASTM D3350 - Standard Specification for Polyethylene Plastics Pipe and Fittings Materials.

8. ASTM F714 - Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter.

9. ASTM F2164 – Standard Practice for Field Leak Testing of Polyethylene (PE) Pressure Piping Systems Using Hydrostatic Pressure

B. American Water Works Association (AWWA)

1. AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances.

2. AWWA C906 - Polyethylene (PE) Pressure Pipe and Fittings, 4-in Through 63-in, for Water Distribution and Transmission.

C. American National Standards Institute (ANSI)

1. ANSI B16.1 - Cast Iron Flanges and Flanged Fittings.

2. ANSI B16.21 - Nonmetallic Flat Gaskets for Pipe Flanges.

3. ANSI/NSF 61- Drinking Water System Components-Health Effects

D. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 DELIVERY, STORAGE AND HANDLING

A. The delivery, storage and handling of the pipe and fittings shall be done in accordance with the manufacturer’s recommendations.

B. Pipe shall be stored on clean, level ground to prevent any scratching or gouging of the pipe. The handling of the pipe shall be done in a manner to avoid dragging the pipe over any hard or sharp objects to avoid cutting of the pipe’s exterior. If gouges/scratches are made in the pipe during handling the depth of the gouge/scratch shall be measured by an independent testing lab at no cost to the District and the results shall be certified in writing to the District.

1. If the gouge is less than 5% of the wall thickness, the gouge does not require remediation.

2. If the gouge is equal to or more than 5% of the wall thickness, the pipe shall be rejected and a section of the pipe shall be removed and re-fused or replaced.

C. The pipe shall be inspected prior to pull back. The Engineer and District reserve the right to reject any and all gouges/scratches regardless of measured depth and or apparent cause. All decisions made by the Engineer and District are final; the Contractor shall remove and repair any rejected pipe sections.

D. Handling of the pipe shall be done in a manner to avoid all undue stress in the pipe caused by bending of the pipe.

E. The interior of the pipe shall be free of cuts, gouges and scratches.

1.06 QUALITY ASSURANCE

A. All HDPE pipe and fittings shall be manufactured in strict accordance with ASTM F714 and shall be from a manufacturer who is fully experienced, reputable and qualified in the manufacture of the polyethylene pipe and fittings to be furnished. All HDPE pipe and fittings shall be supplied by a distributor who is fully experienced, reputable, and qualified with the distribution of the pipe and fittings to be furnished. The pipe shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these specifications. All pipe and fittings shall be NSF 61 approved.

B. All pipes under this contract shall be manufactured from a polyethylene resin that has been specifically stress regression tested to provide a product supplying a minimum Hydrostatic Design Basis (HDB) of 1600 psi, as determined in accordance with ASTM D2837.

C. All HDPE pipe to be installed under this Contract may be inspected at the factory for compliance with this Section by an independent testing laboratory provided by the District. The manufacturer's cooperation shall be required in these inspections. The cost of these plant inspections of all pipe approved for this Contract will be borne by the District.

D. Inspection of the pipe may also be made by the Engineer or other representatives of the District after delivery. The pipe shall be subject to rejection at any time on account of failure to meet any of the specified requirements, even though pipes may have been accepted as satisfactory at the place of manufacture. Pipe rejected after delivery shall be marked for identification and shall immediately be removed from the job.

1.07 WARRANTY

A. The pipe manufacturer shall provide a warranty against manufacturing defects of material and workmanship for a period of 10 years after the final acceptance of the project by the District. The manufacturer shall replace, at no additional cost to the District, any defective pipe material within the warranty period.

PART 2 PRODUCTS

2.01 MATERIALS

A. General

1. HDPE pipe is a flexible conduit and shall be designed to transfer imposed loads to the surrounding embedment medium. The pipe and fittings shall be free from all defects including indentations, delaminations, cracks, bubbles and pinholes, which due to their nature, degree, or extent, detrimentally affect the strength and serviceability of the pipe. Any pipe or fittings with such defects which, in the judgement of the Engineer, will affect the strength and serviceability shall be repaired or rejected.

2. HDPE pipe resins shall be high molecular weight, high density polyethylene with a cell classification number of PE445574C and PE445576C or higher cell classification in accordance with ASTM D3350; and shall be listed in the name of the pipe and fitting manufactured in PPI (Plastics Pipe Institute).

B. Pipe and Fittings

1. Pipe shall have ductile iron pipe size outside dimensions and shall be furnished in DR 11 minimum thickness.

2. All polyethylene pipes shall meet the requirements of ASTM F714. Pipe and fittings for the concentrate pipeline shall be NSF 61 approved.

3. Pipe greater than 4” shall be furnished in standard laying lengths not exceeding 50-ft.

4. Joining system: The pipe and fittings shall be joined with thermal butt fusion joints or electrofusion couplings on a case by case basis with Engineer’s prior approval. All joints shall be made in strict compliance with the manufacturer's recommendations and ASTM 2657.

5. All fittings shall be restrained joint ductile iron mechanical joint fittings as specified in Section 02616 and. shall have a polyethylene wrap with a minimum 8 mils thickness and shall conform to ASTM specification D-1248.

6. Polyethylene pipe will be as manufactured by Performance Pipe; JM Eagle; CSR polypipe or equal.

7. The polyethylene compound will be suitably protected against degradation by ultraviolet light as required by ASTM D1603.

2.02 PIPE IDENTIFICATION

A. At 5-ft intervals along the pipe, the pipe shall be marked with the name of the manufacturer, size and class (pressure and DR), and manufacturing reference to ASTM F714.

B. A color coded green strip(s) shall be marked along the entire length of the pipe.

C. The HDPE pipe shall be laid with two strands of insulated six-gauge wire with 2-3 mil coating and a stainless-steel core It is to be installed at every valve box through a 2-inch PVC pipe to

12-inches minimum above the top of the concrete slab. The 2-inch PVC pipe shall be the same length as the adjustable valve box, and the 2-inch PVC pipe shall be plugged with a 2-inch removable brass plug with recessed nut. This wire is to be continuous with splices made only by direct bury 3M brand splice kit approved by the Engineer. This wire is to be secured to all valves, tees and elbows (see Section 02413).

D. All open cut sections of HDPE mains shall be marked with a detectable marking tape per Section 02221.

2.03 ADAPTORS

A. Polyethylene flange or mechanical joint adaptors with stainless steel stiffeners will be used for connecting polyethylene pipe to ductile iron pipe or other material. For flanged connections, the polyethylene end or will be backed up by a ductile iron flange backup ring conforming to ANSI B16.1 shaped as necessary to suite outside dimension of the HDPE pipe. For mechanical connections, accessories shall include ductile iron gland ring conforming to ANSI/AWWA C110, C111 & C153. Ductile iron coatings shall be ANSI/AWWWA C104/A21.4 (asphaltic paint – NSF 61 approved) Gaskets shall be ANSI/AWWA C111/A21.11 Buna N, Neoprene or Nytryl-based rubber product approved by the Engineer. Corrosion resistant bolts and nuts of Type 304 stainless steel as specified in ASTM A276 and ASTM A307.

B. Polyethylene adaptors will be as manufactured by Orion; Integrity Fusion Products; Specified Fittings or equal.

PART 3 EXECUTION

3.01 INSTALLATION

A. All pipe and fittings shall be installed in accordance with the manufacturer's instructions and ASTM D2774.

B. All fusion joints shall be done by a factory qualified technician as designated by the manufacturer with a minimum of five years experience with the fusion equipment to be used. Installer certification is needed from the Contractor installing thermal butt fused HDPE pipe.

C. Joining of the pipe by heat fusion shall be done in accordance with ASTM D2657. Prior to the start of pipe installation, one test joint shall be made and tested. No joints shall be made until a successful test joint has been made.

D. When cutting pipe is required, the cutting shall be done by machine specifically designed for the cutting of HDPE pipe. The cut shall leave a smooth cut at right angles to the axis of the pipe.

E. Fittings shall be connected to HDPE pipe in accordance with manufacturer's recommendations.

1. A high-density polyethylene flange adapter, or mechanical adapter, made by the manufacturer from the same resin as the pipe, and fully pressure rated to match the pipe DR pressure rating, thermally butt-fused to the stub end of the pipe.

2. Bolts shall be tightened alternatively and evenly to the manufacturer's specified torques. After installation a bitumastic coating shall be applied to bolts and nuts.

3.02 TESTING FOR TRACING WIRE

A. Contractor shall perform a 12-volt DC electrical continuity test on each of the tracer wires. No more than one volt of loss per 1000 feet of mainline pipe will be acceptable. The locator wire system shall pass the 12-volt DC electrical continuity test for at least one wire prior to final acceptance of the pipeline. Any cuts or breaks in the wire shall be repaired by the Contractor at his expense. The locator wire shall be tested by the Contractor at the time of pressure testing. If this test fails, the Contractor is responsible for repairing the locator wire and the pressure test will be reschedule when the wire will pass.

3.03 CLEANING AND TESTING

A. At the conclusion of the work the Contractor shall thoroughly clean all of the new pipelines by pigging to remove all dirt, stones, pieces of wood, or other material which may have entered during the construction period. Debris cleaned from the lines shall be removed from the job site. If, after this cleaning, any obstructions remain, they shall be removed. Provide hoses, temporary pipes, ditches, etc., as required to dispose of flushing water without damage to adjacent properties.

B. Perform hydrostatic testing of all HDPE pipelines as set forth in the following, and conduct said tests in the presence of the Engineer and other authorized agencies, with 48 hours advance notice provided. Provide all labor, equipment and material required for testing the pipeline upon completion of installation, pipe laying and backfilling operations, and placement of any required temporary roadway surfacing.

1. Filled pipelines shall be allowed to thermally stabilize such that the temperatures of the water and the pipe are equal. At temperatures above 100 degrees F, the Engineer shall be consulted regarding the need to reduce the test pressure.

2. The piping shall be tested between valved sections.

3. Test pipelines at 200 psi.

4. Field test all HDPE pipelines for leakage in accordance with manufacturer's recommendations for the size and class of pipeline installed. Unless other procedures recommended by the manufacturer are approved by the ENIGNEER, pressure test the pipeline in accordance with latest version of ASTM F2164

5. If any test of pipeline installed in not in compliance with ASTM F2164 locate and repair the cause of leakage and retest the pipeline, without additional cost to the District. Repair all visible leaks regardless of the amount of leakage

END OF SECTION

SECTION 02999
MISCELLANEOUS WORK AND CLEANUP

PART 1 GENERAL

1.01 SCOPE OF WORK

A. This Section includes miscellaneous operations that are not specified in detail as separate items but can be sufficiently described as to the kind and extent of work involved. The Contractor will furnish all labor, materials, equipment and incidentals to complete the work under this Section.

B. The work of this Section includes, but is not limited to, the following related requirements:

1. Cooperation with other Contractors.

2. Crossing utilities.

3. Relocation of existing utilities, low pressure gas lines, telephone lines, electric lines, cable TV lines, conduits, manholes, inlets and storm drains as necessary, all as shown on the Drawings.

4. Cleaning up.

5. Incidental work.

1.02 SUBMITTAL OF LUMP SUM BREAKDOWN

A. The Contractor will submit to the Engineer a breakdown of the lump sum bid for Miscellaneous Work and Cleanup Item in the Schedule of Values, as required in Section 01370.

1.03 WORK SPECIFIED UNDER OTHER SECTIONS

A. All work will be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of these Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

A. Materials required for this Section will be of at least the same type and quality as materials that are to be restored. Where possible, the Contractor will reuse existing materials that are removed and then replaced, with the exception of paving.

PART 3 EXECUTION

3.01 COOPERATION WITH OTHER CONTRACTORS

A. It will be necessary for the Contractor to plan his work and cooperate with other Contractors in so far as possible to prevent any interference and delay.

3.02 CROSSING UTILITIES

A. This item will include any extra work required in crossing culverts, water courses, drains, water mains, and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required for the crossing, whether or not shown on the Drawings.

3.03 CLEANING UP

A. The Contractor will remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and will render the site of the work in a neat and orderly condition.

3.04 INCIDENTAL WORK

A. Do all incidental work not otherwise specified, but obviously necessary for the proper completion of the contract as specified and as shown on the Drawings.

END OF SECTION

SECTION 09901
SURFACE PREPARATION AND SHOP PRIME PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment, and incidentals required for the surface preparation and application of shop primers on the specified materials, as specified herein and as shown on the Drawings.

B. Surface preparation and priming in field may be done only with the approval of the Engineer.

C. This Section does not apply to factory finished items, unless noted otherwise.

1.02 RELATED WORK

A. Finish Painting is included in Section 09902.

1.03 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, complete shop drawings, manufacturer's specifications, and data on the proposed primers and detailed surface preparation, application procedures, and dry mil thickness.

1.04 REFERENCE STANDARDS

A. The Society for Protective Coatings (SSPC)

1. SSPC SP 1 - Surface Preparation Specification No. 1, Solvent Cleaning

2. SSPC SP 2 - Surface Preparation Specification No. 2, Hand Tool Cleaning

3. SSPC SP 3 - Surface Preparation Specification No. 3, Power Tool Cleaning

4. SSPC SP 6 - Surface Preparation Specification No. 6, Commercial Blast Cleaning

5. SSPC SP 7 - Surface Preparation Specification No. 7, Brush-off Blast Cleaning

6. SSPC SP 10 - Surface Preparation Specification No. 10, Near-White Metal Blast Cleaning

7. SSPC SP 13 - Surface Preparation Specification No. 13, Preparation on Concrete Surfaces

B. American Society of Testing and Materials (ASTM)

1. ASTM D4258 - Standard Practice for Surface Cleaning Concrete for Coating

C. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. The Contractor shall give the Engineer a minimum of 3-days advance notice of the start of any field surface preparation work and a minimum of 7-days advance notice of the start of any shop surface preparation work.

B. All such work shall be performed only in the presence of the Engineer, unless the Engineer has granted prior approval to perform such work in his absence.

C. Inspection by the Engineer, or the waiver of inspection of any particular portion of the work, shall not relieve the Contractor of his responsibility to perform the work in accordance with these specifications.

D. Painting subcontractor shall provide 5 references, which show that the painting subcontractor has previous successful experience with the specified or comparable coating systems. Include the name, address, and the telephone number for the District of each installation for which the painting subcontractor provided the protective coating.

E. Compatibility of Coating Systems:

1. Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with their corresponding primers and finish coats specified in Section 09902 for use in the field and which are recommended by the manufacturer for use together.

F. Primers containing lead will not be allowed.

G. VOC Content: Determine VOC (Volatile Organic Compound) content of solvent borne and waterborne paints and related coatings in accordance with EPA Method 24 or ASTM D3960.

PART 2 PRODUCTS

2.01 MATERIALS

A. All priming materials shall be by the Tnemec Company Inc. Equals by Ameron (VyGuard), Carboline, or ICI/Devoe. The priming schedule has been prepared on the basis of Tnemec products (unless otherwise noted) and Tnemec recommendations for application. No brand other than those named will be considered for approval unless the brand and type of paint proposed for each item in the following schedule together with sufficient data substantiated by certified tests conducted at no expense to the District, to demonstrate its equality to the primer(s) named is submitted to the Engineer in writing for approval within 30 days after the Signing of the Effective Date of the Agreement. The type and number of tests performed shall be subject to the Engineer's approval.

2.02 PRIMER SCHEDULE

A. The following types of primers by Tnemec Co have been used as a basis for the primer schedule:

1. Series 90E-92: Tneme - Zinc - high heat ethyl silicate (to 750 degrees F).

2. Series N69-1255: Hi-build Epoxoline II - polyamidoamine gray epoxy primer.

3. Series 90-97: Tneme -Zinc – aromatic urethane, zinc rich primer.

4. Series N140-1255: Potapox Plus Primer (tank white color) – polyamidoamine epoxy primer.

B. The following surfaces shall have the types of primers scheduled below applied at the dry film thickness (DFT) in mils per coat noted:

1. Ferrous Metals
   a. Submerged or subject to splashing (potable) - NSF STD 61
      1 coat Series N140-1255 (3.5 - 4.5 milsDFT)
   b. Nonsubmerged and not subject to splashing (exterior)
      1 coat Series 90-97 (2.5 - 3.0 milsDFT)
   c. Nonsubmerged and not subject to splashing (interior)
      1 coat Series 69-1255 (3.5 - 4.5 mils DFT)
   d. Surfaces exposed to temperatures above 250 degrees F: See Section 09902
      2 coats 90E-92 (2.0 – 3.5 mils DFT per coat)

2. Non-primed Surfaces:
   a. Gears, bearings surfaces, and other similar surfaces that are not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during all periods of storage and erection and shall be satisfactory to the Engineer up to the time of the final acceptance test.

3. Exposed Bituminous Coated Pipe
   a. A test patch must be run initially to test the paint's compatibility with the tar.
   b. Before successive coats are applied per the schedule, any pipe scheduled to be painted and having received a coating of a tar or asphalt-compound shall be painted with:
      2 coats Series N140-1255 (3.0 - 4.0 DFT per coat).

PART 3 EXECUTION

3.01 APPLICATION

A. Surface Preparation and Priming

1. General
   a. Surfaces shall be dry and free of dust, oil, grease, dirt, rust, loose mill scale, and other foreign material before priming.
   b. Shop prime in accordance with approved paint manufacturer's written recommendations.
   c. Surface preparation for field painting unprimed surfaces or for touch up shall be the same.
   d. Surface temperature and all other application conditions shall be in accordance with approved primer manufacturer's recommendations. Enclosures and auxiliary heat shall be utilized as necessary to achieve compliance.

2. Ferrous Metals
   a. Nonsubmerged and not subject to splashing
      1) Clean in accordance with SSPC SP 6 immediately prior to priming.
      2) Fill all pits and dents and correct all imperfections to provide a smooth surface for painting.

3) Prime as scheduled.

b. Submerged or subject to splashing
   1) Blast clean in accordance with SSPC SP 10 immediately prior to priming.
   2) Grind and sand smooth all metal welds, blisters, and imperfections according to SSPC SP 10.
   3) Fill all pits and dents and correct all imperfections to provide a smooth surface for painting.
   4) Prime as scheduled.

3. Primed, Galvanized, and Previously Painted Surfaces
   a. All coated surfaces shall be cleaned prior to application of successive coats.
   b. Test galvanized steel for manufacturer-recommended treatment or any passivation or pretreatment required.
   c. Cut edges of galvanized sheets and exposed threads and cut ends of galvanized piping, electrical conduit, and metal pipe sleeves, which are not to be finish painted, shall be cleaned in accordance with SSPC SP 1 and primed as specified.
   d. Failing existing coatings, as determined by the Engineer, shall be removed and the surface shall be prepared as listed for the specific material to be painted.
   e. Galvanized and, when ordered, the other metal surfaces specified above shall be cleaned in accordance with SSPC SP 2 to provide a uniform 1-mil surface profile.
   f. Shop-Finished Surfaces:
      1) All shop-coated surfaces shall be protected from damage and corrosion before and after installation by treating damaged areas immediately upon detection. Abraded or corroded spots on shop-coated surfaces shall be cleaned in accordance with SSPC SP 2 and then touched up with the same materials as the shop coat.
      2) All shop-coated surfaces that are faded, discolored, or which require more than minor touch-up in the opinion of the Engineer shall receive new surface preparation before being repainted.
      3) All final cleaning shall be done in accordance with SSPC SP 1 provided the solvent is compatible with the shop finish coat.

4. Exposed Bituminous Coated Pipe
   a. Bituminous-coated pipe shall not be used in exposed locations. Pipe to be exposed in the finished work shall be primed in accordance with the requirements herein. Any bituminous-coated pipe that is inadvertently installed in exposed locations shall be cleaned in accordance with SSPC SP 6 (exposed, non-submerged and not subject to splashing), or SSPC SP 10 (submerged or subject to splashing) before priming and painting. After installation, all exterior exposed flanged joints shall have the gap between adjoining flanges sealed with a single component polysulfide sealant to prevent rust stains.
   b. Primed as scheduled.

END OF SECTION

SECTION 09902
FINISH PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

A. The work of this Section consists of furnishing all materials, labor, equipment, and incidentals required and performing all the painting necessary to complete this Contract in its entirety.

B. It is the intent of this Section to paint all exposed structural and miscellaneous steel and appurtenances, pipe, fittings, supports, valves; all as specified herein, as indicated on the Drawings, and all other work obviously required to be painted unless otherwise specified. Minor items omitted in the schedule of work shall be included in the work of this Section where they come within the general intent of the specifications as stated herein.

C. Paint items so noted in paragraph 1.01B and in accordance with the Painting Schedule and Color Coding Schedule herein. Provide letters and numbers for markings as specified. Items noted in Painting Schedule and Color Coding Schedule herein as having factory finish and other obviously factory finished items shall not be field painted. The Contractor is responsible for having damaged factory finish painted items repaired or, if so ordered, for replacing items. The various Sections are responsible, as stated in each, for preparation and field touch-up of abrasions, welds, and damaged primed areas of primed or galvanized components after erection.

D. The following surfaces or items are not required to be painted under this Section:

1. Portions of metal, other than aluminum, embedded in concrete. This does not apply to the back face of items mounted to concrete or masonry surfaces, which shall be painted before erection. Aluminum to be embedded in or in contact with concrete or masonry shall be coated to prevent electrolysis.

2. Non-ferrous metals (except copper) and stainless steels, unless specified or noted otherwise.

3. Manhole frames and covers.

4. Fiberglass other than piping.

5. Packing glands and other adjustable parts, and nameplates and data plates of mechanical equipment.

6. Mechanical equipment that has been factory finished as specified in Divisions 15.

1.02 RELATED WORK

A. Surface Preparation and Shop Prime Painting is included in Section 09901.

1.03 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, shop drawings, working drawings, and product data including manufacturer's specifications and data on the proposed paint systems and detailed surface preparation, application procedures, and dry film thickness (DFT). Certify

that the systems submitted meet all applicable volatile organic carbon regulations. Equivalent systems are to be submitted at no additional costs to meet any new regulations.

B. Submit to the Engineer, in accordance with Section 01300, color cards, including standard and special colors, for initial color selections.

C. Documentation of the compatibility between prime coats and finish coats shall be submitted along with the date and ambient conditions for all prime coat installation with an established recoat window allowed for each prime system. Corrective surface preparation techniques shall be submitted for all systems in the event that the recoat window is missed.

1.04 REFERENCE STANDARDS

A. National Association of Pipe Fabricators

1. NAPF 500-03 Surface Preparation Standard for Ductile Iron Pipe and Fittings in Exposed Locations Receiving Special External Coatings and/or Special Internal Linings

B. Occupational Safety and Health Act (OSHA)

1. Air Pollution Control Rules

2. Color Coding

C. The Society for Protective Coatings (SSPC)

1. SSPC-SP 6 - Commercial Blast Cleaning

D. National Association of Corrosion Engineer’s (NACE)

1. RP0188-88 - Standard Recommended Practice for Discontinuing (Holiday) Testing of Protective Coatings

E. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Manufacturer Representative

1. The Contractor shall require the paint manufacturer to furnish a manufacturer’s qualified technical representative to visit the project site for technical support as required and ordered and as may be necessary to resolve field questions or problems attributable to or associated with the manufacturer's products furnished under this Contract or the application thereof.

B. Cold Weather Construction

1. All paint shall be at room temperature before applying, and no painting shall be done when the temperature is below 50 degrees F, in dust-laden air, when rain or snow is falling, or until all traces of moisture have completely disappeared from the surface to be painted.

Lower temperatures will only be allowed with written instructions from the paint manufacturer.

C. Inspection and Testing

1. All materials and work shall be accessible and subject to inspection by the Engineer.

2. The completed work shall be inspected visually by the Engineer for skips, holidays, hiding, uniform color and appearance, and other imperfections. All defective work shall be corrected by the Contractor.

3. Coating thickness on steel shall be determined in accordance with SSPC PA 2. The number of readings will be a minimum of that stated in SSPC PA 2.

4. Coating integrity for coatings in immersion areas or subjected to splash and spillage shall be determined in accordance with NACE RP0188-88 using the low voltage wet sponge test method. All holidays will be clearly marked for repair.

5. The Contractor shall furnish to the job site and use for coating inspection and make available to the Engineer, the following test equipment:
   a. Wet film thickness gauge.
   b. Dry film thickness gauge (with certified thickness calibrator) equal to Mikrotest III; Elcometer Inspector III; or Positest.
   c. Surface Temperature Gauge.
   d. Holiday Detector, low voltage type such as Tinker & Rasor Model M-1, Series 9533.
   e. SSPC VIS-1-89T "Pictorial Surface Preparation Standard."
   f. Keane-Tator Surface Comparator Number 372, or equal.
   g. NBS Certified Coating Thickness Standards.
   h. Sling Psychrometer.
   i. Surface moisture metering device equal to Delmhors Model DB.

1.06 DELIVERY, STORAGE AND HANDLING

A. All painting materials shall be delivered to the mixing room in unbroken containers, bearing the manufacturer's brand, date of manufacture, and name. They shall be used without adulteration and mixed, thinned, and applied in strict accordance with manufacturer's directions for the applicable materials and surface before using.

B. Painting materials shall be delivered to the job site in the original unopened containers, bearing the manufacturer's label. A Product Data Sheet and Material Safety Data Sheet for all painting, activators, thinners, accelerators, and other materials shall be obtained from the manufacturer for each shipment of materials to the job site. Painting materials shall be stored in a dry, well-ventilated area, not in direct contact with the ground, where the temperature is maintained between 40 and 120 degrees F. Damaged materials and/or materials exceeding the shelf life shall not be used.

C. Paints shall be mixed in proper containers of adequate capacity. All paints shall be thoroughly stirred before use and shall be kept stirred while using. No unauthorized thinners or other materials shall be added to any paint. Air shall not be used directly for agitation. Pigmented material shall be strained after mixing. Where application equipment has strainers, they should

be sized so as to allow pigment to pass but not foreign material. Multiple (2 or more) component catalyzed materials may not be used beyond the recommended pot life.

D. Work areas will be designated by the District for storage and mixing of all painting materials. Materials shall be in full compliance with the requirements of pertinent codes and fire regulations. Proper containers outside of the buildings shall be provided and used for painting wastes, and no plumbing fixture shall be used for this purpose.

E. All recommendations of the paint manufacturer in regard to the health and safety of workmen shall be followed.

1.07 MAINTENANCE - SPARE MATERIALS

A. Spare Material

1. Furnish one unopened gallon can of each type and each color of paint specified herein.

PART 2 PRODUCTS

2.01 MATERIALS

A. All painting materials shall be supplied by one manufacturer, unless otherwise approved by the Engineer. The painting schedule has been prepared on the basis of Tnemec Company Inc. products and application recommendations, unless otherwise noted in the schedule. Equals by Ameron (VyGuard), Carboline, or ICI/Devoe. No brand other than those named will be considered for approval unless the brand and type of paint proposed for each item in the following schedule together with sufficient data substantiated by certified tests, conducted at no expense to the District, to demonstrate its equality to the paint(s) named, is submitted in writing to the Engineer for approval within 30 days after the signing of the Effective Date of the Agreement. The type and number of tests performed shall be subject to the Engineer's approval.

B. Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with the finish paints to be used. Refer to Section 09901 for special primers.

C. No paint containing lead will be allowed. Oil shall be pure boiled linseed oil.

2.02 PAINT TYPES

A. The following types of paints by Tnemec Co. have been used as a basis for the paint schedule:

Series	Series Name	Generic Description
66	Hi-Build Epoxoline	Polyamide Epoxy
N69	Hi-build Epoxoline II	Polyamidoamine Epoxy
73	Endura-Shield	Semi-Gloss Acrylic Urethane

2.03 PAINT SCHEDULE

A. The following surfaces shall have the types of paints scheduled below applied at the dry film thickness (DFT) in mils per coat noted:

1. Ductile iron pipe
Exterior

Surface Preparation:	SSPC-SP6
1st Coat:	Series N69 (6.0 – 8.0 mils DFT)
2nd Coat:	Series 66 (2.0 – 4.0 mils DFT)
3rd Coat:	Series 73 (2.0 – 3.0 mils DFT)
Min total DFT for 3 coats:	12.0 mils

B. Any surfaces not specifically named in this Section and not specifically excepted shall be prepared, primed, and painted in the manner and with materials consistent with these specifications. The Engineer shall select which of the manufacturer's products, whether the type is indicated herein or not, shall be used for such unnamed surfaces. No extra payment shall be made for this painting.

2.04 LETTERING OF TITLES

A. Each above grade or exposed below grade (i.e. within a valve vault) pipe system shall be titled as “RAW WATER” and alongside this an arrow indicating the direction of flow of liquids. Titles shall not be spaced more than 5 linear feet apart.

B. Titles should be clearly visible from operating positions especially those adjacent to control valves.

C. Application of titles

1. The color of the titles shall be black or white, as approved, to best contrast with the color of the pipes and equipment and shall be stencil applied.

2. Text is to be in ALL CAPS and printed in a single line.

3. Letter sizes

Outside Diameter of Pipe or Covering (in)	Size of Legend Letters (in)
More than 10	3-1/2

4. Arrow sizes. The arrow head shall be an equilateral triangle with sides equal to 6 inches and arrow shaft length equal to 6 inches.

5. When using direction arrows, point arrowhead away from pipe markers and in direction of flow. If flow can be in both directions, use a double-headed directional flow.

PART 3 EXECUTION

3.01 GENERAL

A. No outside spray painting shall be allowed if wind speed exceeds 5 miles per hour or the temperature/humidity is beyond the manufacturer's recommendations. The Contractor shall be responsible for repairs due to overspray.

3.02 PREPARATION OF SURFACES

A. All surfaces to be painted shall be prepared as specified in Section 09901 and as specified herein and shall be dry and clean before painting. Special care shall be given to thoroughly clean interior concrete and CMU surfaces of all marks before application of finish.

B. Concrete surfaces shall have been finished as specified in Section 09901. The Contractor shall report unsatisfactory surfaces to the Engineer. Concrete shall be free of dust, oil, curing compounds, and other foreign matter, and shall conform to ASTM D4258.

C. Refer to Section 09901 for additional requirements.

D. Aluminum embedded or in contact with concrete, masonry, or dissimilar materials must be painted according to the schedule for aluminum in contact with dissimilar materials.

3.03 WORKMANSHIP

A. General

1. Primer (spot) and paint used for a particular surface shall, in general, be as scheduled for that type of new surface. Confirm with the paint manufacturer that the paint proposed for a particular repaint condition will be compatible with the existing painted surface. Sample repainted areas on the actual site will be required to insure this compatibility. Finished repainted areas shall be covered by the same guarantee specified for remainder of work.

2. Protection of furniture and other movable objects, equipment, fittings and accessories shall be provided throughout the painting operations. Canopies of lighting fixtures shall be loosened and removed from contact with surface, covered and protected and reset upon completion. Remove all electric plates, surface hardware, etc., before painting, protect and replace when completed. Mask all machinery nameplates and all machined parts not receiving a paint finish. Dripped or spattered paint shall be promptly removed. Lay drop cloths in all areas where painting is being done to adequately protect flooring and other work from all damage during the operation and until the finished job is accepted.

3. On metal surfaces apply each coat of paint at the rate specified by the manufacturer to achieve the minimum dry mil thickness required. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. One-gallon of paint as originally furnished by the manufacturer shall not cover a greater area when applied by spray gun than when applied unthinned by brush. Deficiencies in film thickness shall be corrected by the application of an additional coat(s). On masonry, application rates will vary according to surface texture, however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous

surfaces, it shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint.

4. Paints shall be mixed in proper containers of adequate capacity. All paints shall be thoroughly stirred before use and shall be kept stirred while using. No unauthorized thinners or other materials shall be added to any paint.

5. Only skilled painters shall be used on the work and specialists shall be employed where required.

6. Smoking shall not be permitted while preparing surface or applying coatings.

B. Field Priming

1. Steel members, metal castings, mechanical and electrical equipment, and other metals that are shop primed before delivery at the site will not require a prime coat on the job. All piping and other bare metals to be painted shall receive one coat of primer before exposure to the weather, and this prime coat shall be the first coat as specified in the painting schedule.

2. Equipment which is customarily shipped with a baked-on enamel finish or with a standard factory finish shall not normally be field painted unless the prefinished equipment is specifically color selected and unless the finish has been damaged in transit or during installation. Surfaces that have been shop painted and have been damaged, or where the shop coats or coats of paint have deteriorated, shall be properly cleaned and retouched before any successive painting is done on them in the field. All such field painting shall match as nearly as possible the original finish.

3. Exposed Bituminous Coated Pipe: See Section 09901.

4. Equipment shipped with a protective shop painting coat or coats shall be touched up to the satisfaction of the Engineer with primers as recommended by the manufacturer of the finish paint.

C. Field Painting

1. All painting at the site shall be designated as Field Painting.

2. All painting at the site shall be under the strict inspection of the Engineer. Only skilled painters and, where dictated by special conditions or systems and so ordered, specialist painters shall be used for the work.

3. All paint shall be a room temperature before applying, and no painting shall be done when the temperature is below 60 degrees F, in dust-laden air, when rain or snow is falling, or until all traces of moisture have completely disappeared from the surface to be painted.

4. All surfaces to be painted as well as the atmosphere in which painting is to be done shall be kept warm and dry by heating and ventilation, if necessary, until each coat of paint has hardened. Any defective paint shall be scraped off and repainted in accordance with the Engineer's directions.

5. Successive coats of paint shall be tinted so as to make each coat easily distinguishable from each other with the final undercoat tinted to the approximate shade of the finished coat to ensure no show through as approved.

6. Finish surfaces shall not show brush marks or other irregularities. Undercoats shall be thoroughly and uniformly sanded with the type of sandpaper appropriate to remove defects and provide a smooth even surface. Top and bottom edges of doors shall be painted and all exterior trim shall be back-primed before installation.

7. Painting shall be continuous and shall be accomplished in an orderly manner so as to facilitate inspection. All exterior concrete and masonry paint shall be performed at one continuous manner structure by structure. Materials subject to weathering shall be prime coated as quickly as possible.

8. Surfaces of exposed members that will be inaccessible after erection shall be cleaned and painted before erection.

9. All materials shall be brush painted unless spray painting is specifically approved by the Engineer. The Contractor shall be responsible for all damage caused by overspray or drifting.

10. All painting shall be performed by approved methods with number of coats modified as required to obtain the total dry film thickness specified. Spray painting shall be performed specifically by methods submitted and as approved by the Engineer. The Contractor shall be responsible for all damage caused by overspray or drifting. On concrete or masonry, back-rolling after spraying shall be undertaken immediately following each coat to assure that all voids and holes are wet out and fully coated. Back-rolling may be deleted from the final coat if the test panel indicates that the prior coats followed by back-rolling is sufficient to provide a continuous coating without pinholes.

11. Coating integrity shall be determined in accordance with NACE RP-0188-88 using the low voltage wet sponge test method. All holidays will be clearly marked for repair.

12. Before final acceptance of the work, all damaged surfaces of paint shall be cleaned and repainted as directed by the Engineer. Completed work shall be free from runs, drips, sags, holidays, voids, and other imperfections. Finish coats shall provide complete hiding and uniform color. All defective work shall be corrected by the Contractor or applicator at no cost to the District.

13. Damaged coatings, pinholes, and holidays shall be feather-edged and repaired in accordance with recommendations of the paint manufacturer.

14. Number of coats in the specification are a minimum required. Additional coats may be required to obtain the minimum required paint thickness, depending on method of application, difference in manufacturer's products and atmospheric conditions.

3.04 COLOR CODING FOR PIPES

A. Color coding shall consist of color code painting and identification of all pipelines including all accessories such as valves, insulated pipe coverings, fittings, and all operating accessories which are integral to the whole functional pipelines.

B. The color code establishes, defines, and assigns a definite color for each category of pipe. Pipelines, equipment, or other items that are not listed in the Color Coding Schedule shall be assigned a color by the Engineer and shall be treated as an integral part of the Contract.

C. All inline equipment and appurtenances not assigned another color shall be painted the same base color as the piping. The pipe system shall be painted with the pipe color up to but not including the flanges attached to pumps and mechanical equipment assigned another color.

D. All colors will be confirmed by the Engineer from color charts submitted by the Contractor, based on the color coding schedule herein.

3.05 COLOR CODING SCHEDULE

A. All color numbers and names herein refer to master color card. Colors of specified equal manufacturers may be substituted with approval of the Engineer.

B. Color selection are to be approved by the Engineer and reviewed by the District at the time of shop drawing review. The Contractor shall submit color charts for color selections.

C. The following Tnemec colors shall be used as a basis for the Color Coding Schedule:

Colors	Tnemec Name	Tnemec #
Olive Green	Clover Green	110GN

3.06 CLEANUP

A. The premises shall at all times be kept free from accumulation of waste material and rubbish caused by employees or work. At the completion of the painting remove all tools, scaffolding, surplus materials, and all rubbish from and about the buildings, and leave work "broom clean" unless more exactly specified.

B. Upon completion, remove all paint where it has been spilled, splashed, or splattered on all surfaces, including floors, fixtures, equipment, furniture, etc., leaving the work ready for inspection.

END OF SECTION

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SECTION 15100
VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install complete and ready for operation and test all non-buried valves as shown on the Drawings and as specified herein.

B. The equipment specified in this section includes the types of valves listed below and located above ground or exposed in vaults.

1. General Requirements
2. Valve Actuators – Manual
3. Butterfly Valves
4. Gate Valves (2.5 Inches in Diameter and Smaller)
5. Resilient Seated Gate Valves (3 Inches in Diameter and Larger)
6. Valve Boxes
7. Corporation Stops
8. Air Release / Vacuum Relief Valves
9. Ball Valves

1.02 RELATED WORK

A. Piping for raw water systems is included Division 2.

B. Certain items similar to those specified in this Section may be specified to be furnished and installed with individual equipment or systems. In case of a conflict, those individual equipment or system requirements shall govern.

C. Valve operators shall be mounted at the factory on the valves as specified herein, as part of the work of this Section.

1.03 SUBMITTALS

A. Submit to the Engineer, in accordance with Section 01300, materials required to establish compliance with this Section.

1. Valve tag number.
2. The manufacturer and supplier.
3. The address at which equipment will be fabricated or assembled.

4. Drawings showing assembly details, materials of construction and dimensions.

5. Descriptive literature, bulletins and/or catalogs of the equipment.

6. The total weight of each item.

7. A complete bill of materials.

8. Additional submittal data, where noted with individual pieces of equipment.

B. Test Reports

1. Provide certified hydrostatic test data, per manufacturer's standard procedure or MSS-SP-61 for all valves.

C. Certificates

1. For each valve specified to be manufactured, tested and/or installed in accordance with AWWA and other standards, submit an affidavit of compliance with the appropriate standards, including certified results of required tests and certification of proper installation.

D. Manufacturer's Installation and Application Data

E. Operating and Maintenance Data

1. Operating and maintenance instructions shall be furnished to the Engineer as provided in Section 01730. The instructions shall be prepared specifically for this installation and shall include all required cuts, drawings, equipment lists, descriptions and other information required to instruct operating and maintenance personnel unfamiliar with such equipment.

1.04 REFERENCE STANDARDS

A. ASTM International

1. ASTM A48 - Standard Specification for Gray Iron Castings.

2. ASTM A126 - Standard Specification for Gray Iron Castings for Valves, Flanges and Pipe Fittings.

3. ASTM A240 - Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels.

4. ASTM A276 - Standard Specification for Stainless Steel Bars and Shapes.

5. ASTM A436 - Standard Specification for Austenitic Gray Iron Castings.

6. ASTM A536 - Standard Specification for Ductile Iron Castings.

7. ASTM B30 - Standard Specification for Copper-Base Alloys in Ingot Form.

8. ASTM B62 - Standard Specification for Composition Bronze or Ounce Metal Castings

B. American Water Works Association (AWWA)

1. AWWA C111 - Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.

2. AWWA C504 - Rubber-Seated Butterfly Valves

3. AWWA C509 - Resilient-Seated Gate Valves for Water Supply Service

4. AWWA C550 - Protective Epoxy Interior Coatings for Valves and Hydrants

5. AWWA C800 - Underground Service Line Valves and Fittings

C. American National Standards Institute (ANSI)

1. ANSI B1.20.1 - Specifications, Dimensions, Gauging for Taper and Straight Pipe Threads (except dry seals).

2. ANSI B16.1 - Cast Iron Pipe Flanges and Flanged Fittings

3. ANSI B16.10 - Face-to-Face and End-to-End Dimensions of Valves

4. ANSI B16.104 - Butterfly Valves

D. American Iron and Steel Institute (AISI)

E. National Electrical Manufacturers Association (NEMA)

F. Underwriters Laboratories (UL)

G. Factory Mutual (FM)

H. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALITY ASSURANCE

A. Qualifications

1. Valves and appurtenances shall be products of well established firms who are fully experienced, minimum 10 years, reputable and qualified in the manufacture of the particular equipment to be furnished.

2. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with this Section as applicable.

3. All units of the same type shall be the product of one manufacturer.

B. Certifications

1. The manufacturers shall furnish an affidavit of compliance with Standards referred to herein as specified in Paragraph 1.03C above. Refer to PART 3 for testing required for certain items in addition to that required by referenced standards.

C. Provide the services of a qualified and factory-trained service representative of the manufacturer to provide operational and maintenance instruction, for a 1-day, 8-hour period for each type of the following equipment:

1. Air release valves.

D. Inspection of the units may also be made by the Engineer or other representative of the District after delivery. The equipment shall be subject to rejection at any time due to failure to meet any of the specified requirements, even though submittal data may have been accepted previously. Equipment rejected after delivery shall be marked for identification and shall be removed from the job site at once.

1.06 SYSTEM DESCRIPTION

A. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of water, wastewater, sludge, air, and chemicals as noted on the Drawings.

B. Valves, appurtenances and miscellaneous items shall be installed as shown on the Drawings and as specified, so as to form complete workable systems.

1.07 DELIVERY, STORAGE AND HANDLING

A. Reference is made to Division 01 for additional information.

B. Packing and Shipping

1. Care shall be taken in loading, transporting and unloading to prevent injury to the valves, appurtenances, or coatings. Equipment shall not be dropped. All valves and appurtenances shall be examined before installation and no piece shall be installed which is found to be defective. Any damage to the coatings shall be repaired as acceptable to the Engineer.

2. Prior to shipping, the ends of all valves shall be acceptably covered to prevent entry of foreign material. Covers shall remain in place until after installation and connecting piping is completed.
   a. All valves 3-in and larger shall be shipped and stored on site until time of use with wood or plywood covers on each valve end.
   b. Valves smaller than 3-in shall be shipped and stored as above except that heavy cardboard covers may be used on the openings.
   c. Rising stems and exposed stem valves shall be coated with a protective oil film which shall be maintained until the valve is installed and put into use.
   d. Any corrosion in evidence at the time of acceptance by the District shall be removed, or the valve shall be removed and replaced.

C. Storage and Protection

1. Special care shall be taken to prevent plastic and similar brittle items from being directly exposed to the sun, or exposed to extremes in temperature, to prevent deformation. See the individual piping sections and manufacturer's information for further requirements.

1.08 MAINTENANCE

A. Special tools and the manufacturer's standard spare parts, if required for normal operation and maintenance, shall be supplied with the equipment in accordance with Section 01730 and where noted, as specified herein. Tools shall be packaged in a steel case, clearly and indelibly marked on the exterior to indicate equipment for which tools are intended.

B. Provide one Operations and Maintenance manual for each type of valve and operator supplied under this specification in accordance with Section 01730.

C. Included within the Operations and Maintenance manuals, provide a list of all spare and replacement parts with individual prices and location where they are available.

PART 2 PRODUCTS

2.01 MATERIALS AND EQUIPMENT – GENERAL

A. Reference is made to Division 1 for additional requirements, including nameplates, provisions for temporary pressure gauges, protection against electrolysis and anchor bolts.

B. The use of a manufacturer's name and/or model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

C. Valves and appurtenances shall be of the size shown on the Drawings or as noted and as far as possible equipment of the same type shall be identical and from one manufacturer.

D. Valves and appurtenances shall have the name of the maker, nominal size, flow directional arrows, working pressure for which they are designed and standard referenced, cast in raised letters or via riveted stainless steel nameplate upon some appropriate part of the body.

E. Unless otherwise noted, items shall have a minimum working pressure the same working pressure as the pipe they connect to, and suitable for the pressures noted where they are installed.

F. Joints, size and material - unless otherwise noted or required by the Engineer:

1. Except where noted, all joints referred to herein shall be of the same type, nominal diameter, material and with a minimum rating equal to the pipe or fittings they are connected to.

2. Valves and appurtenances shall be of the same nominal diameter as the pipe or fittings they are connected to.

3. All valves exposed to view, or in vaults:
   a. 3-in and smaller - threaded ends- unless noted otherwise herein or on the Drawings.
   b. 4-in and larger - flanged ends.

G. Provide all special adaptors as required to ensure compatibility between valves, appurtenances and adjacent pipe.

H. No alternative materials will be considered for approval unless complete documentation is provided regarding their satisfactory long-term use in similar conditions; in addition, the

consideration of any substitution will be considered only if the superiority of the proposed materials is the intent of the substitution, and only if sufficient evidence is provided to document that superiority.

2.02 VALVE ACTUATORS – MANUAL

A. All valve actuators shall conform to AWWA C504 and shall be furnished by the valve supplier.

B. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.

C. Unless otherwise shown, all valves 8-inch diameter and larger shall be equipped with gear actuators. Actuators shall be fully enclosed.

D. Gearing shall be machine-cut steel designed for smooth operation. Bearings shall be permanently lubricated with bronze bearing bushings provided to take all thrusts and seals to contain lubricants. Housings shall be sealed to exclude moisture and dirt, allow the reduction mechanisms to operate in lubricant, and be of the same material as the valve body.

E. Actuators shall be self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering.

F. Manual actuators for above-grade valves shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. Handwheels shall turn counterclockwise to open valves. Actuators shall be designed to produce the required torque with a maximum pull of 40 ft-lbs on the handwheel or chainwheel.

G. Buried valves 8-inch in diameter and larger shall be furnished with buried gear service actuators, extension stem, square operating nut, and valve box. Buried gear service actuators shall be assembled to the valve by the valve manufacturer and shall comply with AWWA C-504.

H. Actuator components shall withstand an input of 450-foot pounds for 30-inch and smaller and 300-foot pounds for larger than 30-inch at extreme actuator positions without damage.

2.03 BUTTERFLY VALVES

A. Valves shall be manufactured in strict accordance with AWWA C504. Valves shall be bubble tight at rated pressures. Valve discs shall rotate 90 degrees from full closed to open. Buried gear actuators shall be assembled to the valve by the valve manufacturer. The valve/operator shall be tested as a complete assembly by the valve manufacturer. The manufacturer shall have produced AWWA butterfly valves for a minimum of five years.

B. Valve bodies shall be constructed of cast iron ASTM A126, Class B and have an interior epoxy coating (min. 6 mils DFT). Exterior coatings shall be as specified in Paragraph 2.11.

C. Buried valves shall be mechanical joint end conforming to ANSI C111, unless otherwise indicated on the Drawings. Valves located above ground shall have Class 150 flange joints. Flange drilling shall conform to ANSI B16.1, Class 125.

D. Valve discs for 12-inch and smaller valves shall be Type 316 stainless steel. For valves larger than 12-inch, discs shall be constructed of cast iron conforming to ASTM A-48 Class 40, or ductile iron conforming to ASTM A-536 Grade 65-45-12 and shall have epoxy coating (min. 6 mils DFT).

E. Rubber valve seats shall be EPDM and mounted to the valve body. For 20-inch and smaller flanged valves, the EPDM seat shall fully line the interior of the valve.

F. Valve shafts shall be Type 304 stainless steel, ASTM A276 and shall be of a diameter not less than those listed in AWWA C504, Class 150B.

G. Shaft seals shall be furnished where the shaft projects thru the valve body. Shaft seals shall be standard split-v type packing or of an O-ring design.

H. Valves shall be fitted with sleeve type bearings contained in the trunions of the valve body. Bearing material shall be nylon for valves thru 20-in and fiberglass with teflon lining for valves 24-in and larger.

I. Valve manufacturer shall furnish and mount operator suitable for buried service. Operators shall be self-locking and suitable for submergence to 20-ft. A 2-in square operating nut shall be furnished. Operator stops shall be capable of withstanding an input of 450 ft-lbs.

J. All valves shall be hydrostatically and leak tested.

K. Valve class shall be AWWA Class 150B with operators sized for bi-directional flow.

L. Butterfly valves shall be manufactured by Pratt or DeZurik.

2.04 GATE VALVES (2.5 INCHES IN DIAMETER AND SMALLER)

A. Valves Gate valves 2.5-in diameter and smaller shall have screwed ends and shall be bronze body. Gate valves 3-in diameter shall be flanged end, iron or bronze body. Gate shall be brass, bronze, or Type 304 stainless steel solid wedge; union bonnet; silicon bronze rising-stem; equal to Jenkins Figure 47CUJ, division of Crane Valve Group; Lunkenheimer Figure 3127, Cincinnati Valve Co, Fairbanks Figure U-0252, or equal. Model numbers referenced above are for screwed ends, flanged shall be equal construction with appropriate end connections.

2.05 RESILIENT SEATED GATE VALVES (3 INCHES IN DIAMETER AND LARGER)

A. Valves 3-in through 36-in shall be non-rising stem type and manufactured in accordance with AWWA C509 and as specified herein. Valves shall be manufactured by American, M&H, Kennedy, or McWane. No others shall be accepted.

B. Valve body shall be ASTM A536 ductile iron with fusion bonded epoxy coating.

C. Valves shall be provided with a minimum of two O-ring stem seals.

D. Bonnet and gland bolts and nuts shall be either ASTM A 126, Class B. All ferrous surface inside and out shall have a fusion-bonded epoxy coating. The hot-dip process in accordance with ASTM A153 is not acceptable. Allen-wrench type bonnet and gland fastening shall not be acceptable and will be rejected.

E. Wedges shall be constructed of ASTM A536 ductile iron and totally encapsulated in vulcanized EPDM.

F. The word "OPEN" and an arrow indicating direction to open shall be cast on each valve body or operator.

G. Operating nut for all gate valves shall be 2-in square.

H. Extension stems shall be fabricated from solid steel. Stems shall not be smaller in diameter than the valve stem. Equip stem with wrench nut. Ensure all stem connections are pinned.

I. Thrust collars and stems shall be integrally cast (not pinned on) and shall feature copper alloy valve stems.

J. Buried valves shall have mechanical joint ends compliant with AWWA C111 unless otherwise noted on the Drawings.

K. Gearing shall be required for gate valves 14-in diameter and larger, and shall be in accordance with AWWA C509 Part 4.4.9.

2.06 VALVE BOXES

A. All gate or butterfly valves shall be provided with extension shafts, operating nuts and valve boxes as follows:

1. Extension shafts shall be carbon steel and the operating nut shall be 2-in square. Shafts shall be designed to provide a factor of safety of not less than four. Operating nuts shall be pinned to the shafts.

2. Top of the operating nut shall be located 2-in below the rim of the valve box.

3. Valve boxes shall be as manufactured by Clow, Mueller, Tyler or equal and shall be a heavy-pattern cast iron, three-piece, telescoping type box with dome base suitable for installation on the buried valves. Inside diameter shall be at least 4-1/2-in. Barrel length shall be adapted to the depth of cover, with a lap of at least 6-inwhen in the most extended position. Covers shall be cast iron with integrally-cast direction-to- open arrow, and the words "RAW WATER" shall also be integrally cast. Aluminum or plastic are not acceptable. A means of lateral support for the valve extension shafts shall be provided in the top portion of the valve box.

4. The upper section of each box shall have a top flange of sufficient bearing area to prevent settling. The bottom of the lower section shall enclose the stuffing box and operating nut of the valve and shall be oval.

5. All fasteners shall be Type 304 stainless steel.

2.07 CORPORATION STOPS

A. 3/4" through 2" corporation stops shall be ball valve type, meeting AWWA Standard C800-01, Sec. 4.2.3 (High Pressure), withstanding working pressures up to 300 psi. The body, ball, operating stem, T-head, and service line connector shall be manufactured from red brass and

conform to ASTM B62 and/or ASTM B584, UNS No. C83600. The ball shall be fluorocarbon coated and shall float on two EPDM seats and be watertight in both directions. The operating stem and nut shall be one piece, held in place by a mating machined flange on the stem and in the body. The operating stem shall have an EPDM O-ring to provide a watertight seal against the body.

B. Inlet threads shall be AWWA Taper, except where used with service clamps, where threads shall be IPS threads. All thread types and diameters shall conform to AWWA C800. The inlet threads will be integral to the body. The waterway diameter shall be approximately equivalent to the nominal size of the stop and shall accommodate the maximum cutter size established by AWWA C800. The outlet shall be a compression connection meeting AWWA C800 Sec. 4.4.9.

C. Corporation Stops shall be FB Style Ballcorp, as manufactured by The Ford Meter Box Company, Inc., Wabash, Indiana, or equal. Where corporation stops are used with plastic pipe, a brass companion flange shall be provided on the outlet of each corporation stop.

2.08 AIR RELEASE AND VACUUM RELIEF VALVES: TAG TYPE NOTED BELOW

A. Pipeline air and vacuum valves shall be supplied with shutoff gate or ball valves with operator handle or lever removed. Valves shall be properly vented and piped to drain.

B. Valve pressure rating shall be at least equal to attached pipe's rating and suitable for 200 psi test pressure. See Table on Sheet CD-3 for valve schedule.

C. Valves for raw water/sewage service shall have connections for draining and flushing with isolation ball valves for connection size up to 3 inch, and solid wedge gate valves for size 4 inch and larger.

D. Air Release Valves: Tag Type ARV.

1. Small orifice assembly air release valves shall automatically release air accumulations from pipe while under positive pressure. When valve body fills with air, float mechanism shall fall to open small orifice and exhaust air to atmosphere. When air has been exhausted, float mechanism shall be buoyed up and shall tightly close small orifice. Small orifice assembly shall be furnished with Type 304 stainless steel body and cover and shall use Type 316 stainless steel hardware. Float mechanism shall be constructed of polypropylene or Type 316 stainless steel. Wetted components shall be polypropylene, Buna-N or Type 316 stainless steel. A resilient, Buna-N seat shall provide drop-tight closure.

2. Separate air release valves shall be, equal as manufactured by APCO 450; Val-Matic; GA; Crispin or equal of the special type for use with non-clean water.

E. Vacuum Breaker Valves: Tag Type VB.

1. Location and sizes of vacuum breaker valves shall be as shown on the Drawings and suitable for 200 psi test pressure.

2. This valve is a combination of a vacuum breaker/relief valve and a combination air valve applicable for non-clean water. The large orifice vacuum valve assembly shall be normally closed and shall automatically open to allow large amounts of air when the pressure falls below atmospheric pressure. The combination valve shall be as specified below.

3. The large orifice assembly shall be furnished with a body of cast iron ASTM A126 Grade B or cast ductile iron ASTM A536 Grade 65. The disc and seat ring material shall be suitable for the intended purpose, test pressure and working pressure rating. The disc shall be rubber faced (Buna N or better). The air inlet shall be protected by a SST 304 screen and steel hood. Opening vacuum pressure setting shall be adjustable by the amount and position of the counter weight. Valves shall have bolted inlets and threaded or plain outlets and protective hoods.

4. Valve shall be or equal by APCO model 1500T, Crispin VR, Val-Matic, Golden Anderson, or equal of the special type for use with non-clean water.

F. Combination Air Valves: Tag Type CAV.

1. Location and sizes of combination vacuum breaker valves shall be as shown on the Drawings and suitable for 200 psi test pressure. This valve is a dual body combination of a vacuum breaker/relief valve and a combination air valve applicable for non-clean water. The vacuum breaker valve shall be as specified above.

2. Valves shall be designed to release large amounts of air during pipeline filling, release small amounts of air accumulated during pipeline operation, and allow large volume of air during pipeline drainage or pipe break. The air outlet shall be throttled with a double acting throttling device. Valve shall have an intake orifice area equal to nominal size of valve. Provide back flushing accessories

3. Valves shall be rated for 200 psi service.

4. The air-vacuum valves shall be combination air valves and shall be APCO 440 SCAV with DAT (Double Acting Throttling Device) set to 5% open with a locking nut, or equal by Crispin VR, Val-Matic, Golden Anderson, of the special type for use with non-clean water.

2.09 BALL VALVES

A. Valves shall be bronze, resilient seated, full port, threaded two-piece bolted body type valves. Manual valves shall have locking levers. The body and cap shall be of brass, ASTM B30, the ball and stem of Type 316 stainless steel and the seats and seals of glass filled TFE. The balls shall be full floating, non-lubricated. Valve seats shall be easily accessible and replaceable.

B. Valves shall be Jamesbury Series 2000 Style 21 as manufactured by Metso Automation; or equal.

2.10 SURFACE PREPARATION AND SHOP COATINGS

A. If not specified herein, coatings shall comply with the requirements of Section 09901 and 09902. In case of a conflict, the requirements of this Section govern.

B. If the manufacturer's requirement is not to require finished coating on any interior surfaces, then manufacturer shall so state and no interior finish coating will be required, if acceptable to the Engineer.

C. The exterior ferrous metal surfaces of above-grade valves, operators, and floor-stands shall be thoroughly cleaned of all scale, dirt, grease or other foreign matter and thereafter one shop coat

of an approved rust-inhibitive primer such as Inertol Primer No. 621 shall be applied in accordance with the instructions of the paint manufacturer or other primer compatible with the finish coat to be provided in the field.

D. Exterior surfaces of buried valves shall be blast cleaned in accordance with SSPC SP-6 and given two shop coats of an approved two-component coal tar epoxy paint.

E. Unless otherwise noted, interior ferrous surfaces of all valves shall be given a shop finish of epoxy conforming to AWWA C550 with a minimum thickness of 6 mil.

F. Ferrous surfaces obviously not to be painted shall be given a shop coat of grease or other suitable rust-resistant coating. Mounting surfaces shall be especially coated with a rust preventative.

G. Special care shall be taken to protect uncoated items and plastic items, especially from environmental damage.

2.11 FACTORY INSPECTION AND TESTING

A. Factory inspection, testing and correction of deficiencies shall be done in accordance with the referenced standards and as noted herein.

B. See Division 1 for additional requirements. Also refer to PART 1, especially for required submission of test data to the Engineer.

C. In addition to all tests required by the referenced standards, the following shall also be factory tested:

1. Butterfly valves shall be factory tested to demonstrate drop tight closure at the specified conditions.

2. All types of air and vacuum valves.

PART 3 EXECUTION

3.01 INSTALLATION – GENERAL

A. All valves and appurtenances shall be installed per the manufacturer's instructions in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.

B. Install all brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings, or otherwise required. Before setting these items, check all Drawings and figures which have a direct bearing on their location. The Contractor shall be responsible for the proper location of valves and appurtenances during the construction of the work.

C. All materials shall be carefully inspected for defects in construction and materials. All debris and foreign material shall be cleaned out of openings, etc. All valve flange covers shall remain in place until connected piping is in place. All operating mechanisms shall be operated to check their proper functioning and all nuts and bolts checked for tightness. Valves and other

equipment which do not operate easily, or are otherwise defective, shall be repaired or replaced at no additional cost to the District.

D. Where installation is covered by a referenced standard, installation shall be in accordance with that standard, except as herein modified, and the Contractor shall certify such. Also note additional requirements in other parts of this Section.

E. Unless otherwise noted, joints for valves and appurtenances shall be made up utilizing the same procedures as specified under the applicable type connecting pipe joint and all valves and other items shall be installed in the proper position as recommended by the manufacturer. Contractor shall be responsible for verifying manufacturers' torquing requirements for all valves.

3.02 INSTALLATION OF MANUAL OPERATIONAL DEVICES

A. Unless otherwise noted, all operational devices shall be installed with the units of the factory, as shown on the Drawings or as acceptable to the Engineer to allow accessibility to operate and maintain the item and to prevent interference with other piping, valves and appurtenances.

B. For manually operated valves 3-in in diameter and smaller, valve operators and indicators shall be rotated to display toward normal operation locations.

C. Floor boxes, valve boxes, extension stems and low floor stands shall be installed vertically centered over the operating nut, with couplings as required and the elevation of the box top shall be adjusted to conform to the elevation of the finished floor surface or grade at the completion of the Contract. Boxes and stem guides shall be adequately supported during concrete placement to maintain vertical alignment.

3.03 INSPECTION, TESTING AND CORRECTION OF DEFICIENCIES

A. See also Division 1. Take care not to over pressure valves or appurtenances during pipe testing. If any unit proves to be defective, it shall be replaced or repaired to the satisfaction of the Engineer.

B. Functional Test: Prior to plant startup, all items shall be inspected for proper alignment, quiet operation, proper connection and satisfactory performance. After installation, all manual valves shall be opened and closed in the presence of the Engineer to show the valve operates smoothly from full open to full close and without leakage. Valves equipped with electric, pneumatic or hydraulic actuators shall by cycled 5 times from full open to full closed in the presence of the Engineer without vibration, jamming, leakage, or overheating. Pressure control and pressure relief valves shall be operated in the presence of the Engineer to show they perform their specified function at some time prior to placing the piping system in operation and as agreed during construction coordination meetings.

C. The various pipe lines in which the valves and appurtenances are to be installed are specified to be field tested. During these tests any defective valve or appurtenance shall be adjusted, removed and replaced, or otherwise made acceptable to the Engineer.

D. Various regulating valves, strainers, or other appurtenances shall be tested to demonstrate their conformance with the specified operational capabilities and any deficiencies shall be corrected or the device replaced or otherwise made acceptable to the Engineer.

3.04 CLEANING

A. All items including valve interiors shall be inspected before line closure, for the presence of debris. At the option of the Engineer, internal inspection of valve and appurtenances may be required any time that the likelihood of debris is a possibility. All pipes and valves shall be cleaned prior to installation, testing disinfection and final acceptance.

END OF SECTION

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