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INVITATION FOR BIDS

FOR

EXCHANGE DRIVE FORCE MAIN REPLACEMENT

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PART H
TECHNICAL SPECIFICATIONS

Bid Set
July 2014

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PART H

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TECHNICAL SPECIFICATIONS

ORANGE COUNTY

Exchange Drive Force Main Replacement Project

Project Sequence Number 70585
CPH Project No. O28424

July 2014

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SUMMARY OF WORK

PART 1 GENERAL

1.01 Section Includes

Summary of work, other contracts, work sequence, working hours, operation of existing facilities, use of premises, OWNER furnished products, coordination, cutting and patching.

1.02 Summary of Work

A. Project consists of removing and replacing ±1,500 lineal feet (LF) of a 4-inch force main located along the right-of-way of Exchange Drive in Orlando Central Park in southwest Orange County. The existing 4-inch force main runs north along Exchange Drive) from Lift Station No. 3323 (LS #3323) to Manhole No. 31480005 located at the driveway of the CVS Pharmacy Distribution Center. The force main pipe run is predominantly located on the west side of Exchange Drive in the right-of-way (ROW). This Project comprises the construction of improvements as shown on the Drawings and specified herein. The Work generally includes but is not limited to the following:

1. Excavation, backfill and compaction for underground utilities
2 Remove and Install a sanitary sewer force main system via open cut method
3. Install 60-inch manhole
4. Install sheeting, shoring and bracing
5. Grout and abandon existing 4-inch force main
6. Placing out of service existing 4-inch sanitary sewer force mains during daily construction activities
7. Remove and replace existing curbs
8. Remove and replace existing driveways
9. Test installed systems
10. Restore and clean-up site

B. All materials, equipment, skills, tools, and labor which is reasonably and properly inferable and necessary for the proper completion of the Work and in compliance with the requirements stated or implied by the Specifications or the Drawings shall be furnished and installed by the CONTRACTOR without additional compensation, whether specifically indicated in the Contract Documents or not.

C. The Orange County Utilities Standards and Construction Specifications Manual (dated February 11, 2011) is incorporated by reference into these specifications. CONTRACTOR shall be aware that adherence to Standards in the County Manual and as described herein shall be required. Should any conflicting information exist between these two documents, then the Orange County Utilities Standards and Construction Specifications Manual shall apply. Orange County Standards are available for download at:

http://www.orangecountyfl.net/YourLocalGovernment/CountyDepartments/Utilities/StandardsConstructionSpecificationsManual.aspx

D. Repair, replace, or otherwise settle with the OWNER or OWNER'S Representative, if damage to property or existing facilities occurs, including damage to pavements, utilities, lawns, structures, etc.

E. Construct the Project under a Unit Price Contract.

F. CONTRACTOR shall perform the work complete, in place, and ready for continuous service, and shall include repairs, testing, permits, clean up, replacements, and restoration required as a result of disruptions caused during this construction.

G. Materials used to complete the Work shall be listed in the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products – February 2011".

H. Any damage that occurs through the fault of the CONTRACTOR, shall be completely restored at the expense of the CONTRACTOR, based upon current County standards.

1.03 Work Under Other Contracts – NOT USED

1.04 Work Sequence

CONTRACTOR's sequence of work may be of his choosing in order to complete the work in the allowed time frame. CONTRACTOR shall submit a schedule and work sequence to the OWNER at least five (5) days prior to the Notice to Proceed. Work on all utility lines shall be accomplished so that all facilities will stay in operation.

1.05 Orange County Working Hours

Normal working hours for the County Inspector are an eight (8) hour period between the hours of 7:00 a.m. – 7:00 p.m., Monday through Friday. Should the CONTRACTOR request, and the County approve the CONTRACTOR to work periods greater than 8 hours a day, he shall make such requests in writing a minimum of 48 hours prior to such work periods. The CONTRACTOR shall pay the cost of $51.00 per hour for inspection by the County's inspection representatives for any hours worked in excess of 8 hours per day or 40 hours per week worked outside the normal work hours for the project.

CONTRACTOR may be required to perform certain work at times of the day or night when system flows, vehicular traffic and pedestrian traffic are at diminished levels and at times appropriate to other activities which are occurring that may affect the project. The CONTRACTOR shall comply with requirements to alter his schedule of work as requested or required by Orange County without change to the contract price or time.

1.06 Operation of Existing Facilities

Proposed work for this project involves the removal/abandonment and replacement of a sanitary sewer force main in active public Rights-Of-Way with both vehicular and pedestrian traffic. CONTRACTOR shall perform work taking all proper precautions and safety measures to insure a safe work area. The work shall be so conducted to maintain existing utility systems in operation. All utilities that occupy or are adjacent to the subject construction site are to remain in operation. The CONTRACTOR shall coordinate all construction activities with the Orange County Resident Inspectors.

1.07 CONTRACTOR Use of Premises

Confine operations at the site to areas permitted by applicable laws, ordinances, permits, and by the Contract Documents. Do not unreasonably encumber the site with materials or equipment. CONTRACTOR shall assume full responsibility for protection and safekeeping of products stored on the job site.

1.08 Coordination

A. CONTRACTOR shall be fully responsible for coordination of his work and the work of his employees, subcontractors, and suppliers and to assure compliance with schedules.

B. Coordination requirements of this Section are in addition to the requirements of this Specification Document.

C. CONTRACTOR is responsible for coordinating with all the utilities regarding locates, protection of existing facilities, testing, or relocations.

1.09 Cutting and Patching

A. Cutting and patching for inspection and testing and the payment therefore shall be as specified in the General Conditions.

B. CONTRACTOR shall, at no additional expense to the OWNER, perform cutting and patching necessary for the completion of the Project. Perform cutting and patching in a manner to prevent damage to the facilities or previously completed work.

C. Refinish surfaces as necessary to provide an even finish. Refinish continuous surfaces to the nearest intersection.

1.10 Drawings and Project Manual

A. Utility Work shall be performed in accordance with the Drawings and Specifications prepared by CPH, Inc., 1117 E. Robinson Street, Orlando, Florida 32801.

B. CONTRACTOR shall verify all dimensions, quantities and details shown on the Utility Drawings and Roadway Drawings, Supplementary Drawings, Schedules, Specifications or other data received from the ENGINEER, and shall notify the same, in writing, of all errors, omissions, conflicts and discrepancies found therein with adequate notice. 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 there from, nor from rectifying such conditions at his own expense.

C. All schedules are given for the convenience of the ENGINEER 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 quantity of materials and equipment included in the Work to be done under this Contract.

D. 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 implied intent, or in the complete and proper execution of the Work, is required and shall be performed by the CONTRACTOR as though the Work were specifically delineated or described.

2. Items of material, equipment, machinery, and the like may be specified on the Drawings and not in the Specifications. Such items shall be provided by the CONTRACTOR in accordance with the specification on the Drawings.

3. The apparent silence of the Specifications 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.

1.11 Weather

During inclement weather, all work which might be damaged or rendered inferior by such weather conditions shall be suspended. The orders and decisions of the ENGINEER as to suspensions shall be final and binding. During suspension of the Work from any cause, the Work shall be suitably covered and protected so as to preserve the Work from injury by the weather or otherwise; and, if the ENGINEER will so direct, the rubbish and surplus materials shall be removed.

1.12 Protection and Restoration

A. CONTRACTOR shall be responsible for the preservation of all public and private property, and shall use every means of protection necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the CONTRACTOR, such property shall be restored by the CONTRACTOR, at his expense, to a condition equal to or better than that existing before the damage was done, or he shall make good the damage in other manner acceptable to the ENGINEER.

B. Protection of Trees and Shrubs

1. Protect with boxes or other barricades.
2. Do not place excavated material so as to injure trees or shrubs.
3. Support trees to prevent root disturbances during nearby excavation.

C. Tree and Limb Removal

1. Tree limbs that interfere with equipment operation and are approved for pruning shall be neatly trimmed and the tree cut coated with tree paint. Trimming and removal of tree limbs shall be incidental.

2. OWNER may order the CONTRACTOR, for the convenience of the OWNER, to remove trees along the line or trench excavation. The CONTRACTOR shall obtain any permits required for removal of trees. Ordered tree removal shall be paid for under the appropriate Contract Items.

D. Trees or shrubs destroyed by negligence of the CONTRACTOR or his employees shall be replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the CONTRACTOR.

E. Sodded Areas – All sodded areas disturbed by construction shall be replaced with like kind to a condition similar or equal to that existing before construction. Where sod is to be removed, sod shall be carefully removed, and the same re-sodded, or the area where sod has been removed shall be restored with new sod in the manner described in the applicable section.

F. CONTRACTOR shall be responsible for locating and protecting (supporting as needed) and/or relocating all utilities lines, including irrigation lines, in the areas of the construction activities. If any existing lines are broken or damaged as a result of construction activities, the CONTRACTOR shall be responsible for repairing the lines at no additional cost to the OWNER.

1.13 Delivery and Storage

A. General

1. CONTRACTOR shall be responsible for all material, equipment and supplies sold and delivered to the OWNER under this Contract until final inspection of the Work and acceptance thereof by the OWNER.

2. All materials and equipment to be incorporated in the Work shall 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.

3. Any materials that, in the opinion of the ENGINEER, become damaged to a point where they are unfit for their intended or specified use shall be promptly removed from the site of the Work, and the CONTRACTOR shall receive no compensation for the damaged material or its removal.

4. In the event any such material, equipment or supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the CONTRACTOR shall replace the same without additional cost to the OWNER.

B. Delivery – The CONTRACTOR shall:

1. Deliver materials in ample quantities to ensure the most speedy and uninterrupted progress of the Work so as to complete the Work within the allotted time.

2. Coordinate deliveries in order to avoid delay in or impediment of, the progress of the Work of any related CONTRACTOR.

3. Schedule deliveries to the site not more than one month prior to scheduled installation without written authorization from the ENGINEER.

4. Arrange deliveries of products in accordance with construction schedules coordinated to avoid conflict with work and conditions at the site.

5. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

6. Immediately upon delivery, inspect shipments with the OWNER'S field representative to ensure compliance with requirements of Contract Documents and approved submittals, and that products are properly protected and undamaged.

7. Provide equipment and personnel to handle products by methods recommended by the manufacturer to prevent soiling or damage to products or packaging.

8. Submit operation and maintenance data to the ENGINEER for review prior to shipment of equipment.

C. Storage – The CONTRACTOR shall:

1. Secure a location for on-site storage of all material and equipment necessary for completion of this project.

2. Protect all material delivered to the job site from dirt, dust, dampness, water and any other condition detrimental to the life of the material from the date of delivery to the time of installation of the material and acceptance by the OWNER.

3. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.

4. When required or recommended by the manufacturer, furnish a covered, weather protected storage structure providing a clean, dry, non-corrosive environment for all mechanical equipment, valves, architectural items, electrical and instrumentation equipment, and special equipment to be incorporated into this project.

5. Arrange the storage area in a manner to provide easy access for inspection. Periodic inspections of stored products shall be done to assure that products are maintained under specified conditions and free from damage or deterioration.

6. Carefully review and comply with the manufacturer's storage instructions. These instructions shall be carefully followed and a written record of this kept by the CONTRACTOR.

7. Rotate moving parts a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding".

8. Clean, flush and lubricated bearings of mechanical equipment to be used in the Work, if stored for longer than ninety (90) days, prior to testing and start-up, at no extra cost to the OWNER.

D. Specific Material Storage Requirements

1. Loose Granular Materials: Store in a well-drained area on solid surfaces to prevent mixing with foreign matter.

2. Cement, Sand and Lime: Stored under a roof and off the ground and kept completely dry at all times.

3. Brick, Block and Similar Masonry Products: Handle and store in a manner to reduce breakage, chipping, cracking and spilling to a minimum.

4. All structural and miscellaneous steel and reinforcing steel: Store 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.

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 to correct the deficiencies, the OWNER 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, and Engineering and any other costs associated with making the necessary corrections. In any event, equipment and materials not properly stored will not be included in a payment estimate. Any materials not suitable for use will be removed from the site immediately and replaced with new materials.

1.14 Manufacturer's Instructions for Installation

A. Comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to all parties involved in the installation, including two copies for the ENGINEER's use. Maintain one set of complete instructions at the job site during installation and until completion. Copies of all instructions shall also be included in the Operation and Maintenance Manuals, which are provided to the OWNER at the close of the contract.

B. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with the manufacturer's instructions, consult with the ENGINEER for further instructions. Do not proceed with Work without clear instructions.

C. Perform Work in strict accordance with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

D. CONTRACTOR shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the installation of the Work and to handle all emergencies normally encountered in Work of this character.

E. Equipment shall be installed in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise in writing by the ENGINEER during installation.

F. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

G. CONTRACTOR shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the ENGINEER and made of ample size and strength for the purposes intended. The manufacturer shall furnish substantial templates and working drawings for installation.

1.15 Construction Field Engineering

A. Registered Land Surveyor: The CONTRACTOR shall retain the services of a registered land surveyor licensed in the State of Florida for the following specific services as applicable to the Work:

1. Identify existing rights-of-ways and property lines along or adjacent to the Work;

2. Locate all existing utilities and structures as may be affected by the Work;

3. Locate control points prior to starting the Work;

4. Replace control points or reference points which may be lost or destroyed.

5. CONTRACTOR is to provide a preliminary set of Record Drawings that reflect any changes to the alignment or connections to existing facilities for the purpose of Certification of Construction Completion to FDEP for clearance of the lines. The As-built information is to be provided to the County prior to the pressure testing of the new line.

6. Prepare a certified survey of the actually constructed facilities based on information concurrent with the construction progress. This site survey shall be in accordance with Section 01720.

B. CONTRACTOR shall protect control points prior to starting the Work and shall preserve all permanent reference points during construction. Report to the OWNER when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.

CONTRACTOR shall bear the cost of re-establishing project control points 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.

C. Submittals

1. Certificate signed by a Registered Surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

2. Certified, signed and sealed drawings, including pdf files of the signed drawings, showing locations of all structures, piping conduits and other improvements. These drawings are referenced as the Project Record Drawings and shall be included with the Project Record Documents.

3. Completed Record Drawing Tables.

4. Documentation to verify accuracy of field engineering work when requested by the ENGINEER.

5. Electronic version of record drawing survey in the latest version of AutoCAD.

1.16 Utilities

A. Utility Construction

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

2. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons, and damage to property. The CONTRACTOR shall, at their own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required.

3. Length of open trench will be controlled by the particular surrounding conditions, but shall always be no more than 300 feet. If the excavation becomes a hazard, or if the excavation excessively restricts traffic at any point, the OWNER may require special construction procedures. As a minimum, the CONTRACTOR shall conform to the following restoration procedures:

a. Interim Restoration: All excavations shall be backfilled and compacted as specified by the end of each working day. For excavations within existing paved areas, concrete base or soil cement base shall be spread and compacted to provide a relatively smooth surface free of loose aggregate material. At the end of each work week, the asphaltic surface course shall be completed and opened to traffic. CONTRACTOR shall coordinate his construction activity including density tests and inspections to allow sufficient time to achieve this requirement. All driveway cuts shall be backfilled, compacted, and limerock base spread and compacted immediately after utility installation. CONTRACTOR shall communicate with COUNTY to coordinate with the individual property owners prior to removing the driveway section. Any utility crossing an existing roadway, parking lot or other paved area shall be patched by the end of the working day. No crushed concrete fines shall be allowed as stabilization where there will be direct wheel contact

   All pipe and fittings shall be stored in a location inside the easement area, which will cause the least disturbance to the public. All debris shall be removed and properly disposed of by the end of each working day.

b. Maintenance of all restored facilities shall be the CONTRACTOR's responsibility. Maintenance shall be performed on an on-going basis during the course of construction.

c. Additional Restoration for Work in Business or Commercial Districts: The CONTRACTOR shall restore all private property, damaged by construction, to original condition. Access to businesses located adjacent to the project site must be maintained at all times. CONTRACTOR may prearrange the closing of business accesses with the business OWNER. Such prearranged access closing shall not exceed two (2) hours. Property drainage and grading shall be restored within 24 hours of backfilling trench.

CONTRACTOR's Progress Schedule shall reflect the above restoration requirements.

B. Existing Utilities

1. Locations of all existing underground piping, structures and utilities have been taken from information received from the respective OWNER. The locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered.

2. CONTRACTOR shall, at all times in performance of the Work, employ approved methods and exercise reasonable care and skill so as to avoid

unnecessary delay, injury, damage or destruction of existing public utility installations and structures; and shall, at all times in the performance of the Work, avoid unnecessary interference with, or interruption of, public utility services; and shall cooperate fully with the Owners thereof to that end.

3. Pipelines shall be located substantially as indicated on the Drawings, but the OWNER reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. When the location of piping is dimensioned on the Drawings, pipe shall be installed in that location; when the location of piping is shown on a scaled drawing, without dimensions, the piping shall be installed in the scaled location unless the OWNER approves an alternate location for the piping. Where fittings are noted on the Drawings, such notation is for the CONTRACTOR's convenience and does not relieve him from laying and jointing different or additional items where required. The ENGINEER may require detailed pipe laying drawings and schedules for project control.

4. CONTRACTOR shall exercise care in any excavation to locate all existing piping and utilities. All utilities shall be carefully protected against damage. Any existing utilities damaged in any way by the CONTRACTOR shall be restored or replaced by the CONTRACTOR at his expense as directed by the OWNER. Any existing facilities that require operation to facilitate repairs shall be performed only by the OWNER of the respective utility.

5. CONTRACTOR is responsible to ensure that all utility or other poles, the stability of which may be endangered by the proximity of excavation, be temporarily stayed and/or shored in position while Work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice of any such excavation by the CONTRACTOR.

C. Notices

1. All governmental utility departments and other owners of public utilities which, may be affected by the Work will be informed in writing by the CONTRACTOR within two weeks after the execution of the Contract or Contracts covering the Work. Such notice will be sent out in general, and directed to the attention of the governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the Work.

2. CONTRACTOR shall also comply with Florida Statute 553.851 regarding notification of existing gas and oil pipeline company owners. Evidence of such notice shall be furnished to the OWNER within two weeks after the execution of the Contract.

3. CONTRACTOR is responsible for contacting utility companies at least 48

hours in advance of breaking ground in any area or on any unit of the Work so maintenance personnel can locate and protect facilities, if required by the utility company.

D. Exploratory Excavations

Exploratory excavations shall be conducted by the CONTRACTOR for the purpose of locating underground pipelines or structures in advance of the construction. Test pits shall be excavated in areas of potential conflicts between existing and proposed facilities and at piping connections to existing facilities a minimum of 48 hours or 1000 feet in advance of Work. If there is a potential conflict, the CONTRACTOR is to notify the ENGINEER immediately. Information on the obstruction to be furnished by the CONTRACTOR shall include: Location, Elevation, Utility Type, Material and Size. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the ENGINEER.

E. Utility Crossings

Whatever existing utilities must be crossed, deflection of the pipe within specified limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when in the opinion of the OWNER this procedure is not feasible, he may direct the use of fittings for a utility crossing or conflict transition as detailed on the Drawings.

F. Relocations

1. Relocations shown on the Drawings – Public utility installations or structures, including but not limited to light poles, signs, fences, piping, conduits and drains that interfere with the positioning of the Work which are shown on the Drawings to be removed, relocated, replaced or rebuilt by the CONTRACTOR shall be considered as 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.

2. Relocation not shown on the Drawings

   a. Where public utility installations or structures are encountered during the course of the Work, and <u>are not</u> indicated on the Drawings or in the Specifications, and when, in the opinion of the OWNER, 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 OWNER, for the CONTRACTOR to accomplish.

   b. If such Work is accomplished by the utility having jurisdiction, the Work 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, the Work will be paid for as a Change Order.

3. All existing utility castings, including valve boxes, junction boxes, manholes, hand holes, pull boxes, inlets and similar structures in the areas of construction that are to remain in service and in areas of trench restoration and pavement replacement, shall be adjusted by the CONTRACTOR to bring them flush with the surface of the finished Work.

4. All existing utility systems which conflict with the construction of the Work herein, which can be temporarily removed and replaced, shall be accomplished at the expense of the CONTRACTOR. Work shall be done by the utility unless the utility approves in writing that the Work may be done by the CONTRACTOR.

G. Lines and Grades

1. All Work under this Contract shall be constructed in accordance with the line and grades shown on the Drawings, or as given by the ENGINEER. The full responsibility for keeping alignment and grade shall rest upon the CONTRACTOR.

2. CONTRACTOR shall, at his own expense, establish all working or construction lines and grades as required from the project control points set by the OWNER, and shall be solely responsible for the accuracy thereof.

3. Water main and force main shall have a minimum of 36-inches of cover over the top of the pipe. Cover shall vary to provide long uniform gradient or slope to pipe to minimize air pockets and air release valves. The stationing shown on the Drawings for air and vacuum release valve assemblies are approximate and the CONTRACTOR shall field adjust these locations to locate these valves at the highest point in the pipeline installed. All locations must be approved by the OWNER.

   To insure a uniform gradient for pressure pipe, all lines shall be installed using control stakes set at 50 ft intervals using surveyors' level instrument.

1.17 Special Project Procedures

A. Construction Phasing

Construction of the project shall be in accordance with the construction schedule. CONTRACTOR shall adjust the schedule and/or MOT to provide for utility installations at no additional cost to Orange County.

B. Maintenance of Traffic

All maintenance of traffic shall be paid for and provided by the CONTRACTOR. Refer to roadway construction documents for maintenance of traffic requirements.

C. Other Utilities

CONTRACTOR should be aware that there are high voltage power lines in the project area.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

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SECTION 01270

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 Description

A. Payment for all Work done in compliance with the Contract Documents, inclusive of furnishing all manpower, equipment, materials, and performance of all operations relative to construction of this project, will be made under Pay Items listed herein. Work for which there is not a Pay Item will be considered incidental to the Contract and no additional compensation will be allowed.

B. OWNER reserves the right to alter the Drawings, modify incidental work as may be necessary, and increase or decrease quantities of work to be performed to accord with such changes, including deduction or cancellation of any one or more of the Pay Items. Changes in the work shall not be considered as a waiver of any conditions of the Contract nor invalidate any provisions thereof. When changes result in changes in quantities of Work to be performed, the CONTRACTOR will accept payment according to Contract Unit Prices that appear in the original Contract. A supplemental agreement between the CONTRACTOR and the OWNER will be required when such changes involve a net increase or decrease of more than 25 percent of the estimated quantity of a payment item where the item amounts to 10% or more of the Contract Price.

C. Quantities necessary to complete the work as shown on the Drawings or as specified herein shall govern over those shown in the Proposal. The CONTRACTOR shall take no advantage of any apparent error or omission in the Drawings or Specifications, and the ENGINEER shall be permitted to make corrections and interpretations as may be deemed necessary for fulfillment of the intent of the Contract Documents.

D. ENGINEER will make measurements and determinations as necessary to classify the work within pay items and determine the quantities for pay purposes; such decisions will be final after 3 days if the CONTRACTOR does not submit a written notice as defined in the following paragraph.

E. If the CONTRACTOR differs with the ENGINEER'S classification of the Pay Items or determination of quantities of the Pay Items, he must notify the ENGINEER in writing within 3 days of the time that the CONTRACTOR is informed of the ENGINEER'S decision. Otherwise the OWNER will not consider any such difference as a claim for payment.

F. Failure on the part of the CONTRACTOR to construct any item to plan or authorized dimensions within the specification tolerances shall result in reconstruction to acceptable tolerances at no additional cost to the OWNER, acceptance at no pay, or,

acceptance at reduced final pay quantity or reduced unit price, all at the discretion of the ENGINEER.

G. Quantity for a payment item will be revised only in the event that the item is determined to be substantially in error. An error shall be deemed substantial if the quantity will increase or decrease in excess of five percent of the original quantity for that item or the amount due for that item will increase or decrease in excess of $500 (whichever is smaller). In general, such revisions will be determined by final measurement or plan calculations or both as additions to or deduction from plan quantities specified within these Contract Documents.

H. Work shall not be considered complete until all testing has been satisfactorily completed and the item of work has demonstrated compliance with plans and specifications.

I. A preliminary monthly application for payment shall be submitted to the OWNER for review five (5) days prior to the submittal for approval of the CONTRACTOR'S monthly payment request.

J. All materials supplied for this project shall be in accordance with the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products". Products that are submitted for use on this project that are not on the approved list will not be considered as acceptable for use.

1.02 Application for payment

A. Applications for Payment shall be submitted by the CONTRACTOR to the OWNER'S Resident Project Representative (RPR) in accordance with the schedule established by General Conditions and Agreement between the OWNER and the CONTRACTOR.

B. Format

1. Submit applications typed on forms provided by the OWNER. The CONTRACTOR shall prepare itemized continuation sheets using the accepted Schedule of Values and attach them to the Application. Each item shall have an assigned dollar value for the current pay period, and a cumulative value for the project to date. Change Orders executed prior to the date of submission shall be listed at the end of the continuation sheets and shall be totaled separately.

2. Include the following items with each copy of the application for payment:

   a. Progress Schedule
   b. Stored Material Log
   c. Partial Release of Liens (for payment for stored material)
   d. Consent of Surety

e. Invoices for Stored Material
f. Updated Record Drawings

3. CONTRACTOR shall certify, for each current pay request, that all previous payments received from the OWNER, under his Contract, have been applied by the CONTRACTOR to discharge in full all obligations of the CONTRACTOR in connection with Work covered by prior applications for payment, and all materials and equipment incorporated into the Work are free and clear of all liens, claims, security interest and encumbrances. CONTRACTOR shall attach to each application for payment like affidavits by all Subcontractors and Suppliers. CONTRACTOR shall also attach a "Consent of Surety" to each application for payment. Additionally, a "Partial Release of Lien" for each subcontractor and supplier shall be attached to each application for payment.

4. Submit seven (7) copies of each application to the Resident Project Representative. Each copy shall include original signatures. The Resident Project Representative shall review the application and verify quantities of installed work and stored materials. Upon RPR approval, the CONTRACTOR shall submit the application to the OWNER for review. When the OWNER finds the application properly completed and correct, the OWNER will make payment to the CONTRACTOR.

C. Work not installed in accordance with the requirements of the Contract Documents or materials not conforming to the Contract Documents will not be approved by the Resident Project Representative, OWNER or OWNER/ENGINEER for payment.

D. Application for Final Payment shall be prepared in accordance with Section 01750 Contract Closeout.

E. Methods of Measurement

1. Units of measurement shall be defined in general terms as follows:

a. Linear Feet (LF)
b. Square Feet (SF)
c. Square Yards (SY)
d. Cubic Yards (CY)
e. Each (EA)
f. Sacks (SK)
g. Lump Sum (LS)
h. Vertical Feet (VF)

2. Unit Price Contracts/Items

a. Linear Feet (LF) shall be measured along the horizontal length of the centerline of the installed material, unless otherwise specified. Pipe

shall be measured along the length of the completed pipeline, regardless of the type of joint required, without deduction for the length of valves or fittings. Pipe included within the limits of lump sum items will not be measured.

b. Square Feet (SF), Square Yards (SY), Cubic Yards (CY), Each (EA) and Sacks (SK) shall be measured as the amount of the unit of measure installed within the limits specified and shown in the Specifications and Drawings. Slope angles and elevations shall be measured by land surveying equipment. CONTRACTOR shall provide supporting documentation (i.e., drawings, truck tickets, invoices, etc.) to verify actual installed quantities.

c. No measurement is required for Lump Sum (LS) items.

3. Lump Sum Contract/Items

Measurement of Work for lump sum contracts and/or items shall be based on the information provided in the Contract Documents and compiled through the CONTRACTOR'S own field verifications, investigations and testing prior to Bidding.

F. The following describes the specific work and methods of measurement for the items listed in the Bid Schedule. Measurement and payment for each Bid Item shall include all labor, materials and equipment required to perform the work included for that respective item to provide a complete and operable installation. Related work not specifically listed or identified, but evidently necessary for satisfactory completion of the item, shall be considered to be included.

G. No separate payment will be made for the following work, and its cost shall be included in the appropriate payment item:

- Applications and pulling of all utility and construction permits;
- Shop drawings, working drawings and samples;
- Field engineering, surveying and layout;
- Clearing and grubbing;
- Trench excavation, sheeting, shoring and bracing;
- Locating and supporting existing utilities;
- Structural fill, backfill, compaction and grading;
- Sodding;
- Cleanup;
- Testing materials and apparatus, including provisions for water to fill, flush and test mains;
- Maintenance of utility service;
- Fittings and pipe restraints;

PART 2 PAY ITEMS

2.01 Mobilization, Demobilization & Bonds (Pay Item 1)

A. Work Includes

Locating existing right-of-ways, existing items to remain and/or be removed and staking of proposed structures and piping alignment as necessary to properly construct the project in accordance with the plans. All deviations from plans must be approved in writing by OWNER prior to construction. Payment of seventy-five percent (75%) of applicable lump sum price for item shall be full compensation for preparatory work and operations in mobilizing for beginning work on project, including, but not limited to, operations necessary for movement of personnel, equipment, supplies and incidentals to project site, and for establishment of field offices, storage sheds, safety equipment and first aid supplies, sanitary and other facilities, bonds, permits, and fees, construction schedules, project signs, insurance, and any other Preconstruction expense necessary for start of work. Payment of remaining twenty-five percent (25%) of applicable lump sum price for item shall include operations, materials, labor, and equipment necessary for cleanup of storage/laydown yard, demobilization from site, and associated work to close out project and will be paid with final pay request.

B. Unit of measurement is lump sum. Amount of bid item shall not exceed five percent (5%) of total base bid.

2.02 Preconstruction Audio-Video Documentation (Pay Item 2)

A. Work Includes

Preconstruction documentation via digital video taping plus all digital or 35 mm color photographs necessary to pick up detail not easily visible or apparent on digital video tape.

B. Unit of measurement is Lump Sum.

2.03 Indemnification (Pay Item 3)

A. Payment is in consideration of Contractor's Indemnity Agreement as set out in Contract Documents, County specifically agrees to give Contractor a maximum of $100.00 and other good and valuable consideration, receipt of which is acknowledged upon signing of the Agreement.

B. Unit of measurement is Lump Sum.

2.04 Project Record Documents (Pay Item 4)

A. Work Includes

Preparation and maintenance of as-built data on a set of Contract Documents to be available on-site as specified in Sections 01340 and 01720, the submittal of updated record drawings with each Application for Payment as specified in Section 01270, and final preparation of Record Drawing Documents in accordance with Section 01720.

B. Unit of measurement is lump sum.

C. Payment for item shall be divided into equal monthly payments based on Contract Time.

2.05 Utility Maintenance of Traffic (Utility M.O.T.) (Pay Item 5)

A. Work Includes

Furnishing all labor, materials, and equipment necessary to maintain public roadway and pedestrian traffic including flag men, uniformed police officers, barricades, warning lights/flashers, and safety ropes. Also included is furnishing, installing and maintaining a Traffic Control Plan, control and safety devices, control of dust, temporary crossing structures over trenches, any necessary detour facilities, and other special requirements for the safe and expeditious movements of traffic.

B. Unit of measurement is Lump Sum.

C. Payment for item will be paid based on percentage of total value of work performed to date, proportional to original contract amount for respective line item.

2.06 Utility System Dewatering (Contaminated Groundwater Monitoring, Reporting, Treatment & Disposal) (Pay Item 6)

A. Work Includes

Furnishing all labor, materials and equipment for providing treatment, disposal and reporting of all contaminated groundwater produced from dewatering systems for installation of Orange County utilities only.

B. Unit of measurement is actual number of days that groundwater treatment and disposal was accomplished in accordance with Part H of TP 900-3 (see **Appendix 3**), for installation of Orange County Utilities only and only if required testing confirms groundwater removed by utility dewatering is contaminated.

2.07 Asphalt Roadway Replacement (Pay Item 7)

A. Work Includes:

Furnishing all labor, materials, and equipment necessary to provide a safe, smooth driving surface. Work shall include saw cutting; pavement removal and proper disposal of exiting pavement, installing prime coat, tack coat, and asphalt, compaction, traffic signalization repair, and temporary striping and markings in accordance with County requirements and specifications. .

B. Units of measurement is based on actual square yards of existing asphalt paving and subgrade removal and replacement furnished and installed in accordance with County requirements and specifications. Width measured for payment of asphalt surface repair, as measured perpendicular to centerline of pipe, shall be limited to width shown on Drawings. Length shall be as measured along centerline of pipe.

C. Payment will be made once and shall include both temporary and permanent Asphalt Roadway Replacement. Payment will be made at contract unit price bid per square yard as stated in proposal for Asphalt Roadway Replacement.

2.08 Concrete Curb and/or Curb and Gutter Replacement (Pay Item 8)

A. Work Includes:

Furnishing all labor, materials, and equipment for saw-cutting, removal and proper disposal of existing concrete curb and gutter, compaction, and concrete curb and gutter replacement for a complete installation.

B. Units of measurement is based on in actual linear feet removed and replaced measured along centerline of curb within excavation of trench to a maximum width equal to width of asphalt pavement cut. All additional curb and gutter damaged shall be replaced by Contractor at his own expense.

C. Payment will be made at contract unit price bid per linear feet as stated in proposal for Concrete Curb and Gutter Replacement

2.09 Chain Link Fence Install/Replacement (Pay Item 9)

A. Work Includes:

Furnishing all labor, materials, and equipment to remove and properly dispose of existing chain link fence and concrete and install new black vinyl chain link fence including replacement fence, gate, support posts and concrete for a complete installation.

B. Unit of measurement is based on actual linear feet removed and replaced as measured along centerline of fence within construction excavation. All additional

fencing damaged shall be replaced by Contractor at his own expense.

C. Payment will be made at contract unit price bid per linear feet as stated in proposal for Chain Link Fence Replacement.

2.010 Bypass Pump (Pay Item 10)

A. Work Includes

Furnishing all labor, materials, equipment as necessary for bypass operations and contingency plan as required, including pumps, piping, and hoses; tankers; temporary bypass and service piping; hauling and proper disposal of wastewater; plugging; gasoline/diesel fuel; protection of existing facilities, utilities, and property; traffic maintenance; signs and barriers; and all incidental work required to satisfactorily complete this item

B. Unit of measurement is based on complete bypass operation and contingency plan in accordance with County requirements and specifications.

2.011 Abandon Existing Force Main (Pay Item 11)

A. Work Includes

Abandon-in-Place Pipe, regardless of size and material. Furnish all labor, materials, and equipment to excavate, backfill and compact; sheet, shore, and brace; dewater; completely drain and properly dispose of pipe contents; grout fill, and plug or cap existing pipes of all services and sizes designated "to be abandoned" on Drawings. Also included in item is removal of existing valve boxes located on valves connected to piping designated to be retired. Valve boxes shall be removed, backfilled and compacted with suitable material.

B. Unit of measurement is linear feet. Measurement shall be measured in actual linear feet satisfactorily abandoned-in-place in accordance with County requirements and specifications (Section 02505). Pipe abandonment shall be measured along centerline without deduction for valves and fittings.

C. Payment will be made at contract unit price bid per linear feet for Abandon-in-Place Pipe.

2.012 Remove Existing Force Main (Pay Items 12)

A. Work Includes:

Furnish all labor, materials and necessary equipment for removal of existing pipe. Includes disconnection from existing mains; removal of valves on both sides of casings; draining and proper disposal of pipe and contents; dewatering and related sampling; and protection and support of existing utilities. Item also includes proper

disposal of all removed materials and complete restoration to like conditions after completion of construction operations. Removal and disposal of excess material and restoration of area included. Also included are line locations, removal and replacement of fences, mailboxes, shrubs, irrigation sprinklers, sodding, and other obstructions, tree removal or protection, and all other items incidental to construction of sanitary sewer.

B. Unit of measurement is linear feet. Measurement shall be measured in actual linear feet satisfactorily removed in accordance with County requirements and specifications (Section 02505). Pipe removal shall be measured along centerline without deduction for valves and fittings.

C. Payment will be made at contract unit price bid per linear feet for pipe removal.

2.013 Furnish & Install Force Main (Pay Items 13 and 14)

A. Work Includes:

Furnishing all labor, materials, and equipment necessary for respective pipeline's complete installation including clearing and grubbing, protection and support of existing utilities, excavation, sheeting, shoring and bracing, dewatering and related sampling, backfill, compaction, grading, survey, layout, pipe, fittings, sleeves, restraints, pipeline warning tape and wire, restraining devices, nuts, bolts, gaskets, sodding, pressure testing (including water supply for filling and flushing main), removal and disposal of excess material, and restoration of area. Also included are line locations, removal and replacement of fences, mailboxes, shrubs, irrigation sprinklers, sodding, and other obstructions, tree removal or protection, and all other items incidental to construction of the sewer. All excavated areas shall be restored to existing conditions or better. Tree removal or protection; installation of silt fencing or other temporary erosion control; connection to (and mechanical restraint of) existing pipes or structures; and all other items incidental to construction of pipelines.

B. Units of measurement for item will be Linear Feet of force main actually furnished and installed.

2.014 Furnish and Install Gravity Sanitary Sewer Main (Pay Items 15)

A. Work Includes:

Furnish all labor, materials, and equipment necessary for clearing, protection of existing utilities, excavation, sheeting, shoring and bracing, dewatering, pipeline installation, backfill, compaction, grading, identification and warning tape, locator balls, all testing, removal and disposal of excess material, and restoration of area. Also included are line locations, removal and replacement of fences, mailboxes, shrubs, irrigation sprinklers, sodding, and other obstructions, tree removal or protection, and all other items incidental to construction of the sewer. All excavated

areas shall be restored to existing conditions or better.

CONTRACTOR shall also be required to clean and video gravity main from lift station to first existing manhole prior installation of new manhole and piping. Following installation, CONTRACTOR shall provide a post construction video of same route.

B. Unit of measurement is linear feet. Depth of each run of sewer between manholes will be determined by measuring at upstream and downstream ends of pipe the depth from invert of pipe to top of rim of manhole, summing two measurements and dividing by two.

C. Payment will be made in accordance with diameter, depth, and linear feet of pipeline installed.

2.015 Precast Concrete Manholes (Pay Item 16)

A. Work Includes:

Furnish all labor, materials, and equipment necessary for constructing manholes (regardless off depth) as necessary for complete installation including excavation, protection of existing utilities, excavation, sheeting, shoring and bracing, dewatering, sodding, backfill, compaction, grading, pipeline identification and warning tape, construction of inverts, all testing, disposal of excess material, and restoration of area. Item also includes line location, removal and replacement of fences, mailboxes, shrubs, irrigation sprinklers, and other obstructions, tree removal or protection, and all other items incidental to construction of manholes. All excavated areas shall be restored to existing conditions or better.

B. Unit of measurement is each. Depth of manholes will be measured from invert of effluent culvert to top of frame.

C. Payment will be made in accordance with type of manhole and depth per each manhole.

2.016 Seal & Recoat Existing Manhole (Upstream & Downstream) (Pay Item 17)

A. Work Includes:

Furnish all labor, equipment, services, supervision and materials for coating existing manholes as shown on Contract Drawings. Work shall include all surface preparation, leak repair, crack repair, installation of coating in accordance with manufacturer's recommendations, and inspection of finished coating system.

B. Unit of measurement is in vertical feet of manhole sealed and recoated. Manhole seal and recoat shall be measured along center vertical length of manhole.

C. Payment will be made at contract unit price bid per vertical feet as stated in proposal for Seal and Recoat Manhole.

2.017 Re-Bench Existing Manhole (Pay Item 18)

A. Work Includes:

Furnish all labor, materials and equipment necessary for cleaning and re-construction of manhole benching including cleaning and debris removal, placement and finishing of concrete, restoration and clean-up.

B. Unit of measurement is each. Measurement for Re-Construct Manhole Benching shall be made per actual number of manhole benching cleaned and re-constructed in accordance with Drawings and specifications.

C. Payment for Re-Construct Manhole Benching shall be made based on authorized quantity at unit price indicated in Bid.

END OF SECTION

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SECTION 01312

PROJECT MEETINGS

PART 1 GENERAL

1.01 Description

Work Specified Herein and Elsewhere

A. Work under this Section includes:

1. Preconstruction meeting.
2. Coordination meetings.

B. Related work specified elsewhere:

Submittals - Section 01340.

1.02 Requirements Included

A. ENGINEER shall schedule and administer preconstruction meeting. Then CONTRACTOR shall schedule all other meetings such as periodic progress meetings, and specially called meetings throughout the progress of the work.

1. Prepare agenda for meetings.
2. Preside at meetings.

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

C. CONTRACTOR shall attend meeting to ascertain that work is expedited consistent with Contract Documents and construction schedules. CONTRACTOR shall provide updated construction schedule and two-week work look-ahead schedules at work progress meetings.

1.03 Preconstruction Meeting

A. ENGINEER will schedule a preconstruction meeting prior to beginning the work. The preconstruction meeting shall be attended by the ENGINEER, the CONTRACTOR, and the OWNER and other affected entities. The purpose of the meeting shall be to review shop drawing procedures, construction methods, and to establish a construction schedule.

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

C. Attendance:

1. OWNER'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. Introduction of Attendees

2. Explanation of Project and Parts to be played by Various Parties

3. Contract Data

   a) Date of Notice to Proceed _____

   b) Date of Substantial Completion _____

   c) Date of Final Inspection _____

   d) Construction Schedule

   e) Progress Meetings

   f) Emergency Contact List

4. Affected Utilities

5. MBE/WBE Requirements

6. DEP Requirements

7. FDOT Requirements

8. Discussion of Construction Site

   a) Mobilization

   b) Site access-storage and lay-down areas

c) Clean up

9. Permits

10. Hours of Work: Generally 7:00 A.M. to 4:00 P.M. Monday thru Friday, except Saturday, Sunday and County holidays.

11. Correspondence

All correspondence through Orange County Utilities addressed to:

Orange County Utilities Engineering
9150 Curry Ford Road
Orlando FL 32825
Phone # 407-254-9900

12. Contractor Submissions

(a) Shop Drawings

(b) No work to be started until Contractor has an approved shop drawings in hand

(c) Emergency Contact List

(d) Maintenance of Traffic Plan

13. Progress Payments

14. R.F.I. Procedures

15. Change Order Procedures

16. Substantial Completion and Final Inspection

17. Record Documents

18. Safety

19. Copies of Drawings and Specifications

1.04 Progress Meetings

A. Schedule regular periodic meetings. Progress meetings will be held every 30 days or less with the first meeting 30 days after the preconstruction meeting or 30 days or less after the date of Notice to Proceed.

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

C. Location of the meetings: Project field office of CONTRACTOR or ENGINEER.

D. Attendance:

1. ENGINEER, and his professional consultants as needed
2. Subcontractors as appropriate to agenda
3. Suppliers as appropriate to the agenda
4. Others as appropriate

E. Suggested Agenda:

1. Review for approval minutes of previous meeting
2. Review work progress since previous meeting
3. Field observations, problems, and conflicts
4. Identify issues which impede construction schedule
5. Review off-site fabrication, delivery schedules
6. Corrective measures and procedures to regain projected schedule
7. Make Revisions to construction schedule
8. Progress, schedule during succeeding work period
9. Coordinate 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 with updates
16. Critical/long lead times

F. CONTRACTOR is to attend progress meetings and is to study 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. CONTRACTOR is to provide a current submittal log and updated work schedule at each progress meeting in accordance with Section 01340.

H. CONTRACTOR shall audiotape all meetings and provide written copies of the minutes to all attendees.

END OF SECTION

SECTION 01315

PRECONSTRUCTION VIDEO

PART 1 GENERAL

1.01 Description

Provide continuous color digital audio-video recording along the entire length of all proposed work prior to construction to serve as a record of pre-construction conditions. For those properties for which service will be relocated from rear to front, provide full recording of each property. Provide two (2) copies of the audio-video recordings on DVD. Supplement video recording with digital color photographs for areas that require details not ascertainable on the video recordings.

1.02 Related Requirements

Section 01340 – Submittals

Submit one copy each to ENGINEER and OWNER for review. If accepted submit two (2) additional copies. If rejected resubmit the same as the initial review.

1.03 Qualifications

Preconstruction audio-video recording shall be of professional quality that will clearly log an accurate visual description of existing conditions. Any portion of the recording not acceptable for determining existing conditions, shall be re-recorded at no additional cost to the OWNER.

PART 2 PRODUCTS

2.01 General

Total audio-video recording system and procedures employed for recording shall be such as to produce a finished product that will fulfill technical requirements of the project. The video portion of the recording shall produce bright, sharp, clear pictures with accurate colors and shall be free from distortion, tearing, rolls or any other form of picture imperfection. The audio portion of the recording shall produce the commentary of the camera operator with proper volume, clarity, and be free from distortion. The recording system shall utilize EIA standard video and NTSC compatible color.

2.02 Camcorder

Recording shall be made with a high definition video camcorder. Camcorder shall record the color signal with a minimum resolution of 2100 pixels.

2.03 DVD

DVD furnished to the County shall be high definition DVD discs. DVDs shall be new and thus shall not have been used for any previous recording.

PART 3 EXECUTION

3.01 General

A. Provide OWNER a minimum of 48 hours notice in advance of recording such that OWNER's representative can be present during recording. The recordings shall contain coverage of all surface features located within the construction's zone of influence. The construction's zone of influence shall be defined (1) as the area within the permanent and temporary easements or right-of-way, and areas adjacent to these areas which may be affected by routine construction operations, and (2) by the direction of the OWNER. The surface features within the construction's zone of influence shall include, but not be limited to, all roadways, pavements, curbs, driveways, ponds, sidewalks, culverts, headwalls, retaining walls, buildings, landscaping, trees, shrubbery, and fences. Of particular concern shall be the existence or non-existence of any faults, fractures, or defects. Taped coverage shall be limited to one side of the street at any one time and shall include all surface conditions located within the zone of influence of construction supported by appropriate audio description.

B. Video recording shall be a simultaneous recorded audio recording. This audio recording, exclusively containing the commentary of the camcorder operator, shall assist in viewer orientation and in any needed identification, differentiation, clarification, or objective description of the feature being shown in the video portion of the recording. The audio recording also shall be free from any conversations between the camcorder operator and any other production technicians.

C. Each DVD shall be labeled and complete with a log of that videotape's contents. The log shall describe the various segments of coverage contained on that DVD in terms of the names of streets or easements, coverage beginning and end, directions of coverage, and video unit counter numbers.

3.02 Recording Schedule

A. Recording shall be performed prior to the placement of any construction materials or equipment on the proposed construction site.

B. CONTRACTOR shall coordinate the video recording with the construction schedule so that those portions of the construction that will be completed first will be recorded first. The recording company shall deliver the DVD recordings to the OWNER upon their completion. Upon delivery of the DVDs, transfer of ownership of those DVDs shall be made to the OWNER.

3.03 Visibility

All recordings shall be performed during times of good visibility. No recording shall be done during periods of significant precipitation, mist, or fog. Recording shall only be done when sufficient sunlight is present to properly illuminate the subject, and to produce bright, sharp video recordings of those subjects. No taping shall be performed when more than 10% of the area to be taped contains debris or obstructions unless otherwise authorized by the ENGINEER.

3.04 Continuity of Coverage

A. In order to increase the continuity of the coverage, the coverage shall consist of a single, continuous, unedited recording, which begins at one end of a particular construction area. However, where coverage is required in areas not accessible by conventional wheeled vehicles and smooth transport of the recording system is not possible, such coverage shall consist of an organized, interrelated sequence of recordings at various positions along that proposed construction area (e.g., wooded easement area).

B. Average rate of travel during a particular segment of coverage (e.g., coverage of one side of the street) shall be directly proportional to the number, size, and value of the surface features within that construction area's zone of influence.

3.05 Camera Height and Stability

When conventional wheeled vehicles are used as conveyances for the recording system, the distance between the camera lens and the ground shall not be more than 10 feet. Camera shall be firmly mounted, such that transport of the camera during the recording process will not cause any unsteady picture.

3.06 Camera Control

Camera pan, tilt, zoom-in, and zoom-out rates shall be sufficiently controlled such that recorded objects will be clearly viewed during videotape playback. In addition, all other camera and recording system controls, such as lens, focus, and aperture, video level, pedestal, chroma, white balance, and electrical focus, shall be properly controlled or adjusted to maximize recorded picture quality.

3.07 Viewer Orientation Techniques

Audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views and visual displays of all visible house and building addresses shall be utilized. In easements where the proposed construction location will not be readily apparent in the videotape viewer, highly visible yellow flags shall be placed in such a fashion as to clearly indicate the proposed centerline of construction.

3.08 Areas to be Videotaped

A. CONTRACTOR shall be able to televise and tape areas with paved roads, along easements, through parks, lawns, and open fields and inside buildings. When video taping on private property, the CONTRACTOR shall give the OWNER sufficient prior notice of such entry so that property owners may be advised of, and their permission obtained for, the work.

B. At no time shall the CONTRACTOR be allowed to use any electrical circuits within private property building structure. All videotaping shall be done during regular business hours, unless otherwise specified by the private property owner or the ENGINEER. The CONTRACTOR shall enter and leave private property in a professional and orderly, workmanlike manner.

END OF SECTION

SECTION 01320

PROJECT COMPLETION SCHEDULE

PART 1 - GENERAL

1.01 SECTION INCLUDES

Project completion scheduling

1.02 SUBMITTALS

A. Within 14 days after the Effective Date of the Contract, CONTRACTOR shall submit for review a preliminary Progress Schedule including a schedule of submittals. The preliminary Progress Schedule shall include all major activities needed to complete project. Include major material and equipment order and delivery times.

B. Preliminary Progress Schedule may be a Bar-Chart Schedule or a Critical Path Method (CPM) Schedule and shall indicate the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents, and indicate in detail the planned activities for the first 60 days of the Contract Time.

C. Prior to submission of first Application for Payment, the complete Progress Schedule shall be submitted and approved by OWNER. The complete Progress Schedule shall utilize CPM formatted by establishing a precedence diagram which is time scaled. Include on schedule activity start dates, stop dates, and duration; critical path; float; delivery schedules; and a 30-day look ahead for Work to be completed. Include submittal dates and durations for components with extended lead times in schedule.

D. Each schedule submittal shall bear a CONTRACTOR approval stamp. The approval stamp will constitute certification to the County that the CONTRACTOR has independently verified all data on that schedule. Also, the stamp will constitute certification that the CONTRACTOR and Subcontractors and Suppliers have reviewed and coordinated the Activities and logic of the Progress Schedule with the requirements of the Work.

E. Project substantial and final completion dates shown on schedule shall be the same as or earlier than the contractual dates.

PART 2 - PRODUCTS – Not Used

PART 3 - EXECUTION

3.01 PROGRESS SCHEDULE

A. At least 14 days before submission of the first Application for Payment, a conference attended by CONTRACTOR, Orange County Utilities (OCU) Project Representative, ENGINEER and others as appropriate will be held to review the preliminary schedule for acceptability to OCU Project Representative. CONTRACTOR shall have an additional 14 days to make corrections and adjustments and to complete and resubmit the complete initial (Revision 0) Progress Schedule. No progress payment shall be made to CONTRACTOR until acceptable schedules are submitted to OCU Project Representative.

B. Progress Schedule shall be a CPM Schedule and will detail how the CONTRACTOR's priorities and sequencing for the Work conform to Contract Times and sequences of Work indicated in or required by the Contract Documents. The Schedule also will reflect how the CONTRACTOR anticipates foreseeable events, site conditions and all other general, local and prevailing conditions that may affect cost, progress, schedule, furnishing and performance of the Work. The Progress Schedule will detail how the CONTRACTOR's Means and Methods translate into Activities and logic. Progress Schedule Early Dates will be based on proceeding with all or part of the Work on the date when the corresponding Contract Time commences to run. Late Dates will be based on completing all or part of the Work on the corresponding Contract Time, even if the CONTRACTOR plans early completion. To the extent that sequences of Work are indicated in or required by the Contract Documents, the Progress Schedule will have Activities and logic portraying the CONTRACTOR's approach to meeting the sequences. Updated or progressed Progress Schedules shall indicate the actual timing and sequencing of completed Work.

C. Schedule of submittals is a part of the Progress Schedule that may be prepared as a separate tabular listing. The Schedule shall provide a workable arrangement for reviewing and processing the required submittals. CONTRACTOR shall coordinate the schedule of submittals with the other parts of the Progress Schedule, allowing for submittal review times specified in the Contract Documents and for re-submittals and re-reviews of complex items. Long lead delivery lead times shall be shown on the schedule of submittals or elsewhere in the Progress Schedule and be based on the scheduled date for acceptance of the submittals for those items.

D. OCU Project Representative will review Progress Schedules for conformance with the Contract Times and any sequences of Work indicated in or required by the Contract Documents. Any review may comment on any requirement that may have a significant bearing on the use of the Progress Schedule to resolve issues affecting Contract Amount or Contract Time. Review comments may also result in the selection of Milestones and recording of Milestone Times. Reviews will not impose on the OCU Project Representative any responsibility for verifying whether Work is omitted, Activity durations are reasonable or Work sequences or Activity timing are practicable. Reviews will not impose on the OCU Project Representative any responsibility for

confirming the adequacy of the level of labor and construction equipment or the reasonableness of Means and Methods. The correctness of the planning and scheduling of the Work will remain the responsibility of the CONTRACTOR.

3.02 PROGRESS SCHEDULE UPDATES

A. CONTRACTOR shall submit a progressed version of the Progress Schedule with each Application for Payment, showing actual progress up to the date of the application. A 30-day look ahead for Work to be completed shall be submitted with each Application for Payment.

B. Progress data shall include:

1. Activities started

2. Activities completed

3. Predicted activity starts

4. Predicted activity completions

5. Changes in original duration for specific activities

6. Changes in activity sequences

7. Percent complete on activities

C. If the update calculations results in early dates for completion of the Work, or a part thereof, beyond the Contract Time or Milestone, CONTRACTOR shall revise the schedule to show how the Work can be completed within the remaining time, or requests an extension of Contract Time if CONTRACTOR believes he is entitled to additional time under the Specifications. A narrative report shall be submitted with any revised or extended Progress Schedule explaining revisions made and actions taken or planned to recover the schedule or obtain a Change Order for an extension of Contract Time.

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SECTION 01340

SUBMITTALS

PART 1 GENERAL REQUIREMENTS

1.01 Description

Work Specified Herein and Elsewhere

This Section includes but is not limited to requirements for the following:

A. Construction Schedules

B. Shop Drawings, Product Data, and Samples

C. Test Results

D. Operation and Maintenance Manuals

E. Record Documents

PART 2 SCHEDULES AND REPORTS

2.01 Schedule of Operations

Submit a schedule of operations to the ENGINEER and OWNER for approval prior to any construction operations. The construction operations shall be sequenced to provide a minimum of interruption to operation of the existing facilities. Inform the OWNER and ENGINEER of any changes in the schedule and allow ample time for the OWNER to alter operations as required by the construction of the various components of the work. Approval of traffic control and schedules shall be obtained from the governmental entity having jurisdiction over the area of work.

PART 3 SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

3.01 Shop Drawings

A. Shop Drawings are original drawings, prepared by the CONTRACTOR, a subcontractor, or distributor, which illustrate some portion of the work; showing fabrication, layout setting, or erection details.

B. Shop drawings shall be prepared by a qualified detailer and shall be identified by

reference to sheet and detail numbers on the Contract Documents. Reproductions for submittal shall be full size readable prints or other print acceptable to the ENGINEER. Reduced size prints will not be reviewed or approved.

3.02 Product Data

A. Product data are manufacturer's standard schematic drawings and manufacturer's catalog sheets, brochures, diagrams, schedules, performance charts, illustrations, and other standard descriptive data.

B. Standard drawings shall be modified to delete information which is not applicable to the project and supplemented to provide additional information applicable to the project.

C. Catalog sheets, brochures, etc., shall be clearly marked to identify pertinent materials, products, or models.

3.03 Samples

Samples are physical examples to illustrate materials, equipment, or workmanship and to establish standards by which work is to be evaluated.

3.04 Contractor's Responsibilities

A. Prior to submission, the CONTRACTOR shall thoroughly check shop drawings, product data, and samples for completeness and for compliance with the Contract Documents and shall verify all dimensions and field conditions and shall coordinate the shop drawings with the requirements for other related work.

B. CONTRACTOR is responsible for errors and omissions in submittals and is not relieved by the ENGINEER'S review of submittals.

C. CONTRACTOR shall notify the ENGINEER, in writing, at the time of submission, of deviations in submittals from the requirements of the Contract Documents and is not relieved by the ENGINEER'S review of submittals, unless the ENGINEER gives written acceptance of specific deviations.

D. Begin no work which requires submittals until return of submittals with ENGINEER stamp and initials or signature indicating the submittal has been reviewed.

3.05 Submission Requirements and Engineer Review

A. Submit six (6) prints of each shop drawing. Submit at least six (6) copies of product data. Submit the number of samples indicated in the individual Specifications Section.

B. Shop drawings, product data, samples and certifications shall be submitted by the CONTRACTOR to the ENGINEER. Submittals should be properly identified with the name of the project, dated, and each lot submitted shall be accompanied by a letter of transmittal referring to the name of the project and to the specification page number and/or Drawing number for identification of each item. Submittals for each type of work shall be numbered consecutively, and the numbering system shall be retained throughout all revisions.

C. Submittals shall bear the CONTRACTOR'S stamp of approval certifying that they have been checked. Submittals without the CONTRACTOR'S initialed or signed certification stamp and submittals which, in the ENGINEER'S opinion, are incomplete, contain numerous errors or have not been properly checked, will be returned unchecked by the ENGINEER for resubmission. The CONTRACTOR shall mark his corrections in Green ink and the ENGINEER'S comments shall be noted in Red.

D. ENGINEER will review submittals with reasonable promptness. ENGINEER'S review of submittals shall not be construed as a complete check and shall not relieve the CONTRACTOR from responsibility for complete compliance with the Contract requirements. No corrections, changes or deviations indicated on submittals reviewed by the ENGINEER shall be considered as a change order.

E. If submittal is acceptable, the ENGINEER will retain three (3) sets of prints and return the remaining prints to the CONTRACTOR. If the submittal is not satisfactory, one set of prints will be retained by the ENGINEER and the remaining prints returned to the CONTRACTOR for appropriate action.

F. In the event a third submittal of shop drawings is required, due to previous submittals of incomplete or incorrect shop drawings not in accordance with the Drawings and Specifications, the CONTRACTOR will be charged one-half the cost incurred by the ENGINEER for the review of the third submittal. The CONTRACTOR shall bear the total cost incurred by the ENGINEER for all subsequent reviews. The ENGINEER costs charged to the CONTRACTOR will be at the cost plus rate generally charged by the ENGINEER and will be deducted by the OWNER from payments due the CONTRACTOR.

G. Distribution of copies of acceptable submittals will be as mutually determined by the CONTRACTOR, OWNER and ENGINEER on an individual item basis during or following the preconstruction conference.

PART 4 OPERATION AND MAINTENANCE MANUALS (NOT USED)

PART 5 RECORD DOCUMENTS

5.01 General

A. As the work progresses, the CONTRACTOR shall mark on a set of Contract Documents all changes from the Contract Documents.

B. Mark on the Contract Documents all changes in direction and location of structures, piping, equipment, electrical, and mechanical work.

C. Mark on the Specifications the manufacturer, trade name, catalog, and supplier of each product actually installed, and mark changes made by change order or field order.

D. At the completion of the work, deliver the record documents to the ENGINEER, in good condition and free from any extraneous notation.

E. Record Drawings shall be submitted and shall be signed and sealed by a licensed surveyor in the State of Florida. Record Drawings shall include horizontal and vertical information for installed facilities.

F. Record Drawings shall meet the requirements of Section 01720 Project Record Documents and Survey.

END OF SECTION

SECTION 01410

REGULATORY REQUIREMENTS

PART 1 GENERAL

1.01 Section Includes

Regulatory requirements, project permits

1.02 Related Sections

General Conditions
Supplementary Conditions

1.03 Requirements of Regulatory Agencies

A. All piping installed within the right-of-way of any city, county, state, or federal highway or railroad shall be in accordance with a permit to construct issued by the controlling agency and obtained by the OWNER. In no case shall an open trench be constructed within a railroad right-of-way unless otherwise indicated.

B. Whenever the Drawings and Specifications conflict with the requirements of the permit, then the requirements of the permit shall govern and the cost of abiding by the provisions of the permit shall be considered incidental to the Contract.

C. All electrical apparatus and wiring pertaining to a piece of equipment or an appliance furnished and installed under this Contract shall comply with the National Electrical Code and shall be listed by Underwriters Laboratories or bear the approval of a recognized Testing Laboratory approved by the ENGINEER.

1.04 Project Permits

A. The following permits are being obtained from the permitting agencies for the construction of the project, and will be provided to the selected CONTRACTOR prior to award of the contract:

1. FDEP Wastewater Permit (See **Appendix 2**)

B. CONTRACTOR shall review and become familiar with all permits for the Project, complete with all conditions, attachments, exhibits and permit modifications. A copy of all permits for the Project shall be maintained by the CONTRACTOR at the project site, and shall be available for review upon request.

C. Any permits not referenced here but that are required for the project will be obtained

by the CONTRACTOR. The CONTRACTOR shall be fully responsible to abide by all provisions of the permits. The CONTRACTOR is responsible for the selection, implementation and operation of all measures required by the permits, including the maintenance of said measures as necessary during construction. No additional compensation will be allowed for any work associated with permit requirements.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01415

STORMWATER POLLUTION PREVENTION / NPDES REQUIREMENTS

PART 1 GENERAL

1.01 Section Includes

Stormwater Pollution Prevention Plan requirements and recommendations under the NPDES program for construction projects located in Florida.

1.02 Purpose

The purpose of this section is to outline minimum requirements for stormwater pollution prevention as required under the NPDES program.

1.03 Related Sections

A. Section 01410 – Regulatory Requirements

B. Section 02370 – Erosion and Sediment Control

1.04 Abbreviations

A. NPDES - National Pollution Discharge Elimination System

B. SWPPP - Stormwater Pollution Prevention Plan

C. NOI - Notice of Intent

D. NOT - Notice of Termination

1.05 Definitions

The term "NPDES Generic Permit" means the State of Florida Department of Environmental Protection (FDEP) Generic Permit for Stormwater Discharge from Large and Small Construction Activities.

1.06 Construction Projects Requiring Compliance with NPDES Generic Permit

A. All projects 1 or more acres in size that discharge to offsite areas.

B. Smaller projects that are in the same construction corridor as larger construction projects where the larger project is 1 or more acre in size and is required to comply with the NPDES Generic Permit. In this case, even if the smaller project is less than 1 acre in size, the smaller project must comply with the NPDES Generic Permit.

1.07 General Requirements

A. Construction of this project is required to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) Generic Permit for Stormwater Discharge from Small and Large Construction Activities.

B. In order to meet NPDES requirements, the CONTRACTOR is responsible for preparing a Stormwater Pollution Prevention Plan (SWPPP), implementing, inspecting, maintaining, and reporting on all elements of the SWPPP, completing and submitting the required Notice of Intent (NOI) and Notice of Termination (NOT) forms as the Operator, and paying all associated fees. Copies of the NPDES Generic Permit, NOI, and NOT forms, and permit application fee information are available for download at dep.state.fl.us/water/stormwater/npdes/

C. CONTRACTOR must include in the SWPPP the names and addresses of all subcontractors working on this project who will be involved with the major construction activities that disturb site soil or who implement a pollutant control measure. These subcontractors, in addition to the CONTRACTOR, shall comply with the requirements of the NPDES Generic Permit and any local governing agency having jurisdiction concerning erosion and sedimentation control, and shall sign a copy of the certification statement in the SWPPP.

D. SWPPP shall describe and ensure the implementation of best management practices which will be used to reduce the pollutants in stormwater discharge associated with construction activity and to assure compliance with the terms and conditions of the NPDES Generic Permit. The erosion and sediment control measures shown on these Drawings are the minimum required and are to be installed prior to construction. The CONTRACTOR is responsible for complying with all applicable rules, regulations and water quality standards and may need to install additional controls to meet these requirements.

1.08 SWPPP Implementation and Submittal Requirements

A. Complete SWPPP prior to submittal of the NOI and shall include the elements necessary to comply with the NPDES Generic Permit for construction activities administered by the FDEP and shall also include all local governing agency and OWNER requirements. There may be more stringent local government or OWNER requirements for Erosion and Sediment Control, which would be located in the Specifications or on the Drawings. The more stringent requirement governs.

B. CONTRACTOR must file the NOI with FDEP and the OWNER at least two (2) business days prior to the start of construction. The CONTRACTOR shall also submit a copy of the NOI to the MS4 operator for all projects that discharge stormwater associated with construction activity to a municipal separate stormwater

system (MS4). A copy of the NOI and a description of the project must be posted in a prominent place for public viewing at the construction site.

C. Implement SWPPP at the start of construction. A complete copy of the SWPPP, including copies of all inspection reports, plan revisions, etc., must be retained at the project site at all times during working hours and kept in the permanent project records for at least three years following submission of the NOT.

D. Final Stabilization means that all soil disturbing activities at the site have been completed, and that a uniform perennial vegetative cover (evenly distributed, without large bare areas) with a density of at least 70% for all unpaved areas and areas not covered by permanent structures has been established or equivalent permanent stabilization measures (such as geotextiles) have been employed. Once construction is completed and final stabilization has been achieved, the CONTRACTOR must file the NOT to FDEP, the OWNER, and the MS4 operator within 14 days.

1.09 Inspections

A. CONTRACTOR is responsible to assure the adequacy of site pollutant discharge controls. Between the time the SWPPP is implemented and final site stabilization is achieved, all disturbed areas and pollutant controls must be inspected at least once every seven calendar days and within 24 hours following a rainfall of 0.5 inches or greater. Inspections are to be conducted by the CONTRACTOR's qualified designated representative.

B. All inspections shall be documented in an inspection report that summarizes the scope of the inspection, the names and qualifications of personnel making the inspection; the date of the inspection; rainfall data; major observations relating to the implementation of the SWPPP, and actions taken in order to ensure compliance with NPDES requirements and the SWPPP. Such reports shall identify any incidents of non-compliance and actions taken to bring the project into compliance. Where a report does not identify any incidents of non-compliance, the report shall contain a certification that the facility is in compliance with the NPDES requirements and the SWPPP. Each inspection report shall be signed and certified by each inspector.

1.10 Updating and Modifying the SWPPP

A. Based on inspection results, any modifications necessary to increase effectiveness of the SWPPP to an acceptable level must be made within seven calendar days of the inspection.

B. Update SWPPP each time there are significant modifications to the pollutant prevention system or a change of contractors working on the project who disturb site soil. For construction activities where the operator changes, the new operator shall file an NOI for coverage under this permit at least two (2) days before assuming control of the project and the previous operator shall file an NOT to terminate permit

coverage in accordance with the NPDES Generic Permit. Amendments to the plan shall be prepared, signed, dated, and kept as attachments to the original SWPPP.

1.11 Minimum SWPPP Provisions

A. Each SWPPP shall provide a description of pollutant sources and other information including a description of the nature of the construction activity; the intended sequence of major activities which disturb soils for major portions of the site; estimates of the total area of the site and the total area of the site that is expected to be disturbed by excavation, grading, or other construction activities; existing data describing the soil or the quality of any discharge from the site and an estimate of the size of the drainage area for each discharge point; a site map indicating drainage patterns and approximate slopes anticipated after major grading activities, areas of soil disturbance, an outline of areas which may not be disturbed, the location of major structural and nonstructural controls identified in the plan, the location of areas where stabilization practices are expected to occur, surface waters, wetlands, and locations where stormwater is discharged to a surface water or MS4; and the latitude and longitude of each discharge point and the name of the receiving water(s) for each discharge point.

1.12 Minimum Erosion and Sediment Control Construction Requirements

A. Stabilize all construction site exits with coarse aggregate or other approved materials, in accordance with details on the Drawings. Other minimum construction requirements that need to be implemented in order to comply with the NPDES Generic permit include installation of sediment barriers down slope from construction activities that disturb site soil; constructing rock surface temporary parking areas; installation of sediment barriers down slope prior to clearing and grubbing; installation of sediment barriers on the down slope side of utility construction and soil stockpiles; and the installation of sediment barriers on the down slope side of grading activities.

B. Stabilization measures shall be initiated as soon as practicable, but in no case more than 7 days, in portions of the site where construction activities have temporarily or permanently ceased.

C. OWNER has the authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, trenching, borrow and embankment operations. OWNER also has authority to direct CONTRACTOR to provide immediate permanent or temporary erosion and sediment control measures.

D. CONTRACTOR shall respond to erosion and sediment control maintenance requirements or implement additional measures to control erosion ordered by OWNER or governing authorities within 48 hours or sooner if required at no additional cost to the OWNER.

E. CONTRACTOR shall incorporate permanent erosion control features into project at earliest practical time to minimize need for temporary controls.

F. For drainage basins with 10 or more disturbed acres at one time, a temporary (or permanent) sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent control measures, shall be provided where attainable until final stabilization of the site. The 3,600 cubic feet of storage area per acre drained does not apply to flows from offsite areas and flows from onsite areas that are either undisturbed or have undergone final stabilization where such flows are diverted around both the disturbed area and the sediment basin. For drainage basins with 10 or more disturbed acres at one time and where a temporary sediment basin providing 3,600 cubic feet of storage per acre drained, or equivalent controls is not attainable, a combination of smaller sediment basins and/or sediment traps and other BMPs should be used. At a minimum, silt fences, or equivalent sediment controls are required for all sideslope and downslope boundaries of the construction area.

G. Water trucks shall be used as needed during construction to reduce dust generated on the site. Dust control must be provided by the CONTRACTOR and shall be in compliance with applicable local and state dust control regulations.

1.13 Maintenance Requirements

A. Maintain all erosion and sediment control measures throughout construction. Repair or replace all damaged sediment barriers. Remove accumulated sediment along all silt fences where the height of the sediment exceeds one-third of the height of the silt fence. Inspect all temporary and permanent grassing areas and re-grass where there are bare spots, washouts, or unhealthy growth.

B. At the completion of construction, once final stabilization has been achieved, clean all accumulated sediment from all storm structures, pipelines, and stormwater ponds. Remove all temporary sediment controls upon receipt of authorization to remove has been received from the OWNER or ENGINEER. Note that this may not occur for some time after construction activities have been completed, in order to ensure their removal has not occurred until final stabilization has been achieved to the satisfaction of the OWNER and ENGINEER.

1.14 Stormwater Discharge Provisions

A. Non-stormwater components of site discharge must be clean water. Water used for construction, which discharges from the site, must originate from a public water supply or private well approved by the governing local agency. Water used for construction that does not originate from an approved public supply must not discharge from the site. Allowable non-stormwater discharges include discharges from fire fighting activities; Fire hydrant flushing; Water used to wash vehicles or control dust; Water flowing from potable sources and water line flushing; Irrigation drainage; and runoff from pavement wash down where spills or leaks of toxic or

hazardous materials have not occurred (unless all spilled material has been removed) and where detergents have not been used.

B. Solid materials, including building materials, are not allowed to be discharged from the site with stormwater. All solid waste, including disposable materials incidental to the major construction activities, must be collected and placed in containers. The containers shall be emptied periodically by a contract trash disposal service and hauled away from the site.

C. Substances that have the potential for polluting surface and/or groundwater must be controlled by whatever means necessary in order to ensure that they do not discharge from the site. As an example, special care must be exercised during equipment fueling and servicing operations. If a spill occurs, the spill must be contained and disposed so that the spill will not flow from the site or enter groundwater, even if this requires removal, treatment, and disposal of soil in accordance with local and state regulations.

D. All personnel involved with construction activities must comply with state and local sanitary or septic system regulations. Temporary sanitary facilities shall be provided at the site throughout the construction phase. Sanitary facilities must be used by all construction personnel and shall be serviced by a commercial operator.

E. Discharges resulting from groundwater dewatering activities at construction sites are permitted provided the groundwater is free of sediments, is not contaminated, and dewatering occurs in accordance with state and local governing agency regulations.

F. Store chemicals, paints, solvents, fertilizers, and other toxic material in waterproof containers. Except during application, the contents must be kept in trucks or within storage facilities. Runoff containing such material must be collected, removed from the site, treated, and disposed at an approved solid waste or chemical disposal facility.

G. Prevent discharge of hazardous substances or oil in the stormwater discharge(s) from a facility or activity. This does not relieve the operator of the reporting requirements of 40 CFR part 117 and 40 CFR part 302. The operator shall submit within 14 calendar days of knowledge of the release a written description of: the release (including the type and estimate of the amount of material released), the date that such release occurred, the circumstances leading to the release, and remedial steps to be taken. The SWPPP must be modified within 14 calendar days of knowledge of the release to: provide a description of the release, the circumstances leading to the release, and the date of the release. In addition, the plan must be reviewed to identify measures to prevent the reoccurrence of such releases and to respond to such releases, and the plan must be modified where appropriate.

CONTRACTOR AND SUBCONTRACTOR CERTIFICATION

The CONTRACTOR and subcontractor(s) that will implement the pollutant control measures described in the SWPPP must be identified below. Each must sign a statement certifying that they understand the NPDES Generic permit authorizing stormwater discharges during construction. These statements must be maintained in the SWPPP file on site.

CONTRACTOR implementing the SWPPP:

_____

Business Name

_____

Business Address

_____

_____

_____

Business Telephone Number

CERTIFICATION: (Note signature requirements in Part VI.G. of the NPDES Generic Permit.)

"I certify under penalty of law that I understand, and shall comply with, the terms and conditions of the Generic Permit for Stormwater Discharge from Large and Small Construction Activities and this Stormwater Pollution Prevention Plan prepared thereunder."

_____

Signature Date

_____

Printed Name

CONTRACTOR
CERTIFICATION

The SWPPP has been prepared by:

_____

Business Name

_____

Business Address

_____

_____

_____

Business Telephone Number

The CONTRACTOR who has prepared the SWPPP shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

_____

Signature Date

_____

Printed Name

PART 2 PRODUCTS – Not Used

PART 3 EXECUTION – Not Used

END OF SECTION

SECTION 01420

REFERENCES

PART 1 GENERAL

1.01 Section Includes

Referenced standards and abbreviations

1.02 Referenced Standards

A. Any reference to published specifications or standards of any organization or association shall comply with the requirements of the specification or standard which is current on the date of Advertisement for Bids. In case of a conflict between the referenced specifications or standards, the one having the more stringent requirements shall govern.

B. In case of conflict between the referenced specifications or standards and the Contract Documents, the Contract Documents shall govern.

1.03 Abbreviations

The following are definitions of abbreviations used within the Project Manual:

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
ANSI	American National Standard Institute
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
CRSI	Concrete Reinforcing Steel Institute
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FS	Florida Statutes
NEC	National Electrical Code
NECA	National Electrical Contractors' Association
NEMA	National Electrical Manufacturers Association
NSF	National Sanitation Foundation
OOCEA	Orlando-Orange County Expressway Authority
OSHA	Occupational Safety and Health Administration
PS	United States Products Standards
SSPC	Structural Steel Painting Council

UL	Underwriter's Laboratories, Inc.
FDOT Specification	FDOT Standard Specification for Road and Bridge Construction, latest edition
FDOT Index	FDOT Roadway and Traffic Design Standards, latest edition

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01450

QUALITY CONTROL

PART 1 GENERAL

1.01 Section Includes

Quality control, quality assurance

1.02 Quality Control

A. CONTRACTOR is responsible for performing all work to a degree and in a manner that satisfies and complies with the Project requirements. In order to fulfill this responsibility, the CONTRACTOR is required to have an approved Quality Control Program, including testing, as part of his Contract work in accordance with the Contract Documents and to submit details of his Program to the ENGINEER for review and approval prior to commencing any construction operations. The submittal shall include detailed information on locations and number of all tests, etc., that will be necessary for the CONTRACTOR to make his own determination that the work is being performed in compliance with the Project requirements.

B. CONTRACTOR'S Quality Control Program shall include, but not be limited to, the following in addition to the type and frequency of tests as required by the technical specifications:

1. Piping and structural excavation, bedding and backfill materials and density quality control testing.

2. Determination of compaction effort needed for compliance with the density requirements.

3. Portland cement concrete and asphalt paving quality control testing including design mix review, materials, field slump and air content, and field and lab cured strength samples and testing.

C. In addition to Quality Control Testing, the CONTRACTOR shall be responsible for required testing or approvals for any work (or any part thereof) if laws or regulations of any public body having jurisdiction specifically require testing, inspections or approval. The CONTRACTOR shall pay all costs in connection therewith and shall furnish the ENGINEER the required certificates of inspection, testing or approval. The CONTRACTOR shall also be responsible for and shall pay all costs in connection with any inspection or testing required in connection with OWNER or ENGINEER acceptance of a supplier of materials or equipment proposed to be incorporated into the work.

D. Any design or testing laboratory utilized by the CONTRACTOR shall be an

independent laboratory acceptable to the OWNER and the ENGINEER, approved in writing and complying with the latest edition of the "Recommended Requirements for Independent Laboratory Qualification", and published by the American Council of Independent Laboratories.

E. Testing laboratories, whether provided by the OWNER or the CONTRACTOR, shall promptly notify the ENGINEER and the CONTRACTOR of irregularities or deficiencies of work which are observed during performance of services. Laboratories shall submit two (2) copies of all reports directly to the ENGINEER and two (2) copies to the CONTRACTOR.

1.03 Quality Assurance

A. In addition to the services provided by the laboratory paid for by the CONTRACTOR as a part of his work, the OWNER, at his sole discretion, may employ an additional independent soils laboratory as part of OWNER'S Quality Assurance Program to verify that the work meets the requirements of the Contract Documents. The OWNER furnished Quality Assurance testing may include the type and frequency of tests as required by the technical specifications. The OWNER reserves the right to have additional tests made beyond those specified in the Contract Documents. The CONTRACTOR shall cooperate with the OWNER and make the work and samples available for OWNER testing at no additional cost in case the OWNER chooses to have additional OWNER furnished testing performed. CONTRACTOR is responsible to see that his work meets all provisions of the Contract Documents.

B. CONTRACTOR shall cooperate with the soils laboratory personnel and provide access to the work to be tested. The CONTRACTOR shall notify the ENGINEER and OWNER'S testing laboratory sufficiently in advance of operations to allow scheduling of tests. The CONTRACTOR shall furnish casual labor and facilities to obtain and handle samples at the site and to store and cure test samples as required.

1.04 Testing of Materials

A. Unless otherwise specified, all materials shall be sampled and tested in accordance with the latest published standard methods of ASTM in effect at the time bids are received. If no ASTM Standards apply, applicable standard methods of the Federal Government or of other recognized agencies shall be used.

B. Test of materials shall be made by a representative of the CONTRACTOR, unless otherwise provided. Testing of equipment shall be the responsibility of the CONTRACTOR or an authorized manufacturer's representative. All test results shall be furnished to the ENGINEER in writing. The CONTRACTOR shall provide facilities required to collect and forward samples. The CONTRACTOR shall furnish the required samples without charge.

C. CONTRACTOR shall not make use of or incorporate in the work, the materials represented by the sample until tests have been made and the material found to be in

accordance with the requirements of the Specifications.

D. Materials to be tested and the applicable test procedure shall be as outlined in the individual sections of these Specifications.

1.05 Source and Quality of Materials and Equipment

A. Source of materials to be used shall be in accordance with the Contract Documents and as approved by the ENGINEER before delivery. The approval of the source of any material shall continue as long as the material conforms to the Specifications.

B. All material not conforming to the requirements of the Specifications shall be considered as defective and shall be removed from the work. If in place, faulty materials shall be removed by the CONTRACTOR at his expense and replaced with acceptable material unless permitted otherwise by the OWNER. No defective materials which have been subsequently corrected shall be reused until approval has been given.

C. Upon failure of the CONTRACTOR to comply immediately with any order of the ENGINEER to remove and replace defective material, the OWNER shall have authority to remove and replace defective materials, and to deduct the cost of removal and replacement from any monies due or to become due to the CONTRACTOR. Failure to reject any defective materials or work at the time of installation shall in no way prevent later rejection when such defects are discovered, nor obligate the OWNER to final acceptance.

1.06 Construction Progress Photographs

CONTRACTOR shall be responsible for taking construction progress photographs throughout the progress of the work. This may include but not be limited to photos for water line crossings of other utilities, valve installations, service connections fittings, etc. Copies of the photos shall be in digital format and be provided to the County RPR on a weekly basis.

1.07 Additional Testing

In addition to soils laboratory and materials testing, the CONTRACTOR shall perform other testing called for in the Contract Documents including but not limited to piping, pressure, leakage, infiltration and exfiltration, as appropriate.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

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SECTION 01516

TEMPORARY BYPASS PUMPING SYSTEM

PART 1 - GENERAL

1.01 SCOPE

A. CONTRACTOR shall furnish all materials, labor, equipment, power and maintenance to implement a temporary pumping system while performing replacement of the in-service sewer lines and lift station rehabilitation.

B. Temporary bypass pumping system shall divert the existing wastewater flow around the work area. The purpose of bypassing is to prevent wastewater overflows and provide continuous service to all wastewater customers. The CONTRACTOR shall maintain wastewater flow in the construction area in order to prevent backup and/or overflow and provide reliable wastewater service to the users of the wastewater system at all times.

C. CONTRACTOR shall include in his bid and bear all expenses incurred to provide bypass pumping (including but not limited to) all temporary piping, valves fittings, controls and temporary power. Temporary bypass pumping capability shall be maintained from start to completion of construction as specified herein.

D. Design, installation, and operation of the temporary pumping system shall be CONTRACTOR'S responsibility. The temporary pumping system shall comply with the requirements of all codes and regulatory agencies having jurisdiction. CONTRACTOR shall employ the services of a vendor who can demonstrate to ENGINEER that he specializes in the design and operation of temporary bypass pumping systems.

1.02 BYPASS PLAN

A. CONTRACTOR shall submit to the OWNER a comprehensive written plan for approval and acceptance that describes the intended bypass for the maintenance of flows during construction. The CONTRACTOR shall also provide a sketch showing the location of bypass pumping equipment for each line segment(s) around which flows are being bypassed. The plan must be specific and complete, including such items as schedules, locations, elevations, capacities of equipment, material and all other incidental items necessary and/or required to ensure proper protection of the facilities, including protection of public and private property from damage and flooding by surcharging of sewers. No construction shall begin until all provisions and requirements have been reviewed and approved by ENGINEER. The plan shall include but not be limited to details of the following:

1. Staging areas for pumps
2. Sewer plugging method(s) and types of plugs
3. Number, size, material, location and method of installation of discharge piping
4. Diversion pump sizes, capacity, number of each size to be on site, and fuel requirements
5. Calculations of static lift, friction losses, and flow velocity
6. Manufacturer's pump performance curves for all pumping equipment.
7. Required fuel source and location
8. Discharge plan
9. Method of protecting discharge manholes or structures from surface water infiltration, erosion and damage
10. Thrust and restraint block sizes and locations
11. Method of noise control for each pump and/or generator
12. Any temporary pipe supports and anchoring required
13. Calculations for selection of diversion pumping pipe size
14. Schedule for installation of and maintenance of diversion pumping lines
15. Plan indicating selected location of diversion pumping line and air valve locations
16. Overflow control contingency plan
17. Proposed tanker(s)
18. Work schedule
19. Monitoring log for bypass pumping
20. Monitoring plan of the bypass pumping operation
21. Maintenance of traffic plan
22. Emergency back up plan and equipment

B. CONTRACTOR shall cease bypass operations and return flows to the new and/or existing sewer when directed by the OWNER. All piping shall be designed to withstand at least twice the maximum system pressure or a minimum of 50 psi whichever is greater. During bypassing, no wastewater shall be leaked, dumped, or spilled in or onto, any area outside of the existing wastewater system. When bypass operations are complete, all bypass piping shall be drained into the wastewater system prior to disassembly.

C. Temporary By-Pass for Water and Force Mains

1. CONTRACTOR is responsible for all means and methods necessary for installation, support, protection and removal of all temporary water main and force main piping.

2. Temporary force main and water main piping to be restrained for the entire length of pipe.

3. Temporary pipe and fittings are not part of the asset table. Fitting identifications shown on asset table are for permanent fittings only.

4. CONTRACTOR is responsible for determining the best suitable location for temporary water main and force main piping within the limits of right-of-way. At no time shall any temporary piping encroach outside of the right-of-way limits.

5. Temporary connections shall be limited to 2 each for water main and force main (one at each end of temporary pipe). If the temporary piping is constructed in segments adding additional connections the piping shall be the cost of the CONTRACTOR and not the COUNTY.

6. CONTRACTOR shall submit to the COUNTY a comprehensive written plan for approval and acceptance that describes the intended bypass for the maintenance of flows during construction. The CONTRACTOR shall also provide a sketch showing the location of bypass water and force main. The plan shall include any proposed bypass piping, backup plan and equipment, work schedule, monitoring log and plan for bypass operation, and maintenance of traffic plan. The CONTRACTOR shall cease bypass operations and return flows to the new and/or existing water and sewer systems when directed by the COUNTY, but after approval by the FDEP. Plan shall show that every water and wastewater customer is served with the connection size they currently have from the existing main from the proposed bypass piping.

7. COUNTY shall accept the bypass plan prior to implementation of the bypass. The CONTRACTOR shall maintain the temporary water main and force main system at all times and shall ensure that the systems are not allowed to

shut down.

8. CONTRACTOR shall be responsible for monitoring the bypass operation 24 hours per day, 7 days per week. If accepted in the bypass plan by the COUNTY, any electronic monitoring in lieu of on-site monitoring must be detailed in the comprehensive written plan and approved by the COUNTY.

9. CONTRACTOR shall have all materials, equipment and labor necessary to complete any repair, replacement, or rehabilitation on the job site prior to isolating the water main and force main. The CONTRACTOR shall demonstrate that the mains are in good working order and is sufficiently sized to successfully handle flows by performing a test run for a period of 24 hours prior to beginning the work.

10. CONTRACTOR shall be liable for all COUNTY personnel and equipment costs, penalties and fines resulting from problems associated with the temporary water main or force main not functioning as required. The CONTRACTOR is required to establish adequate bypass pumping as required regardless of the flow conditions in the systems.

1.03 QUALITY ASSURANCE

A. CONTRACTOR shall be responsible design, installation, and operation of the temporary pumping system. The diversion system shall meet the requirements of all codes and regulatory agencies having jurisdiction. CONTRACTOR shall be responsible for any spillage of raw sewage that results in civil or criminal charges from any local, state, or federal agency and will bear all costs for these charges and any restoration required.

B. CONTRACTOR shall provide and maintain adequate equipment, piping, tankers, and other necessary appurtenances in order to maintain continuous and reliable wastewater service in all wastewater lines as required for construction. The CONTRACTOR shall have tankers, backup pump(s), piping, and appurtenances ready to deploy immediately.

1.04 BYPASS OPERATION

A. OWNER shall accept the bypass plan prior to implementation of the bypass.

B. CONTRACTOR shall be required to install all equipment and connections for the by-pass pumping system prior to any demolition activities of the pump station.

C. By-pass pumping shall be required to be in successful operation for a minimum of 48 hours prior to existing pumping facilities being taken out of service.

D. CONTRACTOR shall plug off and pump down the sewer manhole or line segment in

the immediate work area and shall maintain the wastewater system so that surcharging does not occur.

E. Where work requires the line to be blocked beyond working hours and bypass pumping is being utilized, the CONTRACTOR shall be responsible for monitoring the bypass operation 24 hours per day, 7 days per week. If accepted in the bypass plan by the OWNER, any electronic monitoring in lieu of on-site monitoring must be detailed in the comprehensive written plan and approved by the OWNER.

F. CONTRACTOR shall ensure that no damage will be caused to private property as a result of bypass pumping operations. The CONTRACTOR shall complete the work as quickly as possible and satisfactorily pass all tests, inspections and repair all deficiencies prior to discontinuing bypassing operations and returning flow to the sewer manhole or line segment.

G. CONTRACTOR shall immediately notify the OWNER should a sanitary sewer overflow occur and take the necessary action to clean up and disinfect the spillage to the satisfaction of the OWNER or other governmental agency. If sewage is spilled onto public or private property, the CONTRACTOR shall wash down, clean up and disinfect the spillage to the satisfaction of the OWNER.

H. One back-up pump equal to the primary unit shall be required. Bypass pumps shall have a maximum rating of 55 decibels for sound attenuation.

I. Pumping System Extra Materials

1. Spare parts for pumps and piping shall be kept on site at all times.

2. Spare parts shall include, but not be limited to, the following:

   a. One (1) spare pump identical to the operating pumps.

   b. 50 feet of extra pipe for each pipe size in use.

3. For each diversion discharge line installed, the CONTRACTOR shall have available at the site repair clamps or necessary fittings for the pipe system being used.

1.05 CONTRACTOR LIABILITY

CONTRACTOR shall be responsible for all required pumping, equipment, piping, and appurtenances to accomplish the bypass and for any and all damage that results directly or indirectly from bypass pumping equipment, piping and/or appurtenances. CONTRACTOR shall also be liable for all OWNER personnel and equipment costs, penalties and fines resulting from sanitary sewer overflows. These specifications require the CONTRACTOR to establish adequate bypass pumping as required regardless of the flow condition.

PART 2 - PRODUCTS

2.01 DESIGN REQUIREMENTS

A. CONTRACTOR shall provide all pipeline plugs, pumps of adequate size to handle peak flow, and temporary discharge piping, to ensure that the wastewater flows can be safely diverted around the main pumping station. Diversion pumping system shall be operated 24 hours per day 7 days per week.

B. CONTRACTOR shall furnish and install a temporary non-clog pumping system and associated temporary above- or below-grade piping to pump wastewater around the construction conflict. The pumping system shall be provided with an on-line non-clog backup pump in the event of breakdown. The discharge piping shall be provided with a discharge plug valve for flow throttling purposes.

C. CONTRACTOR is responsible for preparing the by-pass pumping methods and sequencing.

2.02 PERFORMANCE REQUIREMENTS

A. It is essential to the operation of the existing transmission system that there be no interruption in the flow of wastewater throughout the duration of the Project. CONTRACTOR shall provide, maintain, and operate all temporary facilities such as plugs, pumping equipment (both primary and backup units as required), conduits, all necessary power or fuel source, and all other labor and equipment necessary to handle the sewage by-pass flow.

B. CONTRACTOR shall be responsible for design, installation, and operation of the flow diversion pumping system shall be CONTRACTOR's responsibility. The diversion system shall meet the requirements of all codes and regulatory agencies having jurisdiction.

C. CONTRACTOR shall provide all necessary means to safely convey the wastewater past the work area. CONTRACTOR shall not stop or impede the interceptor flows under any circumstances.

D. CONTRACTOR shall maintain sewage flow around the work area in a manner that will not cause surcharging of sewers, damage to sewers, and that will protect public and private property from damage and flooding.

E. CONTRACTOR shall protect water resources, wetlands, and other natural resources.

2.03 EQUIPMENT

A. All pumps shall be centrifugal, end suction, fully automatic self-priming units that do not require the use of foot-valves, diaphragm pumps, or vacuum pumps in the priming system. The pumps must be diesel powered. Hydraulic submersible type and electric submersible type pumps will not be acceptable for temporary bypass pumps. All pumps shall be constructed to allow dry running for long periods of time to accommodate the cyclical nature of sewage flows.

B. CONTRACTOR shall provide the necessary stop/start controls and a visual alarm indicating a pump malfunction for each pump. Each pump shall have a 0-30 inch Hg vacuum gauge on the inlet and a 0-60 PSI pressure gauge on the outlet.

C. CONTRACTOR shall incorporate noise prevention measures for any and all equipment used to insure minimum noise impact on the surrounding areas. Such measures shall include but not be limited to:

1. Hospital grade silencers or mufflers.

2. Equipment modifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. CONTRACTOR shall have all materials, equipment and labor necessary to complete the repair, replacement, or rehabilitation on the job site prior to isolating the gravity main segment, manhole, or pump station. CONTRACTOR shall demonstrate that the pumping system is in good working order and is sufficiently sized to successfully handle flows by performing a test run for a period of 48 hours prior to beginning the work.

B. CONTRACTOR is responsible for locating any existing utilities in the area CONTRACTOR selects to locate the diversion pipelines. CONTRACTOR shall obtain approval of the pipeline locations from the OWNER prior to installation.

C. CONTRACTOR shall locate bypass pumping suction and discharge lines so as to not cause undue interference with the use of streets, private driveways, and alleys to include the possible temporary trenching of piping at critical intersections. Ingress and egress to adjacent properties shall be maintained at all times. Ramps, steel plates or others methods shall be deployed by the CONTRACTOR to facilitate traffic over surface piping. High traffic commercial properties may require alternate methods.

3.02 INSTALLATION

A. Plugging or blocking of sewage flows shall incorporate primary and secondary plugging devices. When plugging or blocking is no longer needed for performance and acceptance of work, the plugs or blocks shall be removed in a manner that permits the sewage flow to slowly return to normal, to prevent surcharging or causing other major disturbances downstream.

B. When working inside manholes, CONTRACTOR shall exercise caution and comply with OSHA requirements when working in the presence of sewer gases, combustible oxygen-deficient atmospheres, and confined spaces.

C. CONTRACTOR shall protect diversion lines from damage in the areas of backhoe operations. Protection shall be by either concrete Jersey Barriers or word timbers.

3.03 FIELD QUALITY CONTROL

A. CONTRACTOR shall perform a hydrostatic pressure test for each section of discharge piping using a pressure equal to 1.5 times maximum operating pressure of the system to ensure there are no leak in discharge piping prior to actual operation.

B. Operator shall inspect the diversion pumping system from pump suction to the temporary screening facility every hour the diversion system is in operation or on a schedule approved by OWNER. An inspection log shall be kept at the pumping site.

C. Each inspection log shall be marked with a time clock stamp to ensure the required maintenance and inspections are performed. Failure to perform these inspections will result in immediate removal of the Operator from the site and CONTRACTOR shall be assessed liquidated damages of $1,000.00 for each occurrence. Copies of the maintenance and inspection logs shall be submitted to ENGINEER on a weekly basis or as directed by ENGINEER.

3.04 PROJECT CLOSEOUT

A. Temporary pumping system shall remain operable for at least 72 hours after the work in the pump station is completed. System removal shall be approved by the ENGINEER. Once written permission is issued, CONTRACTOR shall remove all components of the temporary pumping system.

B. Disturbed Areas

On completion of the diversion pumping operation, CONTRACTOR shall clean all areas disturbed by these operations and restore all areas to equal or better conditions that existed prior to the start of work.

END OF SECTION

SECTION 01520

TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 Section Includes

Construction facilities, controls, temporary utilities, project identification signs, field office and storage sheds, storage of materials and equipment.

1.02 Construction Facilities and Temporary Controls

A. Responsibility

All construction facilities and temporary controls remain the property of the CONTRACTOR establishing them and shall be maintained in a safe and useful condition until removed from the construction site.

B. Temporary Electric Service

1. CONTRACTOR shall furnish and maintain temporary lighting and power required to perform the Work as necessary. Include in the Bid all costs for providing temporary electrical service.

2. Temporary service shall include protective enclosures, branch wiring, outlets, lamps, and grounding as required by NEC and Local Electrical Codes.

C. Temporary Heating

CONTRACTOR shall furnish fuel or power and provide and operate all temporary heating units. Heat shall be provided as necessary to perform the Work. Temporary heating units shall be adequately vented and approved devices which will not damage finished areas. CONTRACTOR shall also furnish all tarpaulins and temporary enclosures necessary to provide this protection.

D. Temporary Ventilation

CONTRACTOR shall provide, operate, and furnish power for temporary ventilation required for the proper installation and curing of materials and safety of workmen to prevent hazardous accumulations of dust, fumes, or vapors.

E. Telephone Service

CONTRACTOR shall provide and maintain telephone service at the job site in the

event of an emergency situation. The CONTRACTOR shall pay for all local calls; toll calls shall be paid for by persons making such calls.

F. Temporary Water

1. Provide a temporary water distribution system for all construction purposes and pay for all water used.

2. Furnish potable drinking water in suitable dispensers and with cups for use of all employees at the job.

3. Provide all temporary piping, hoses, etc., required to transport water to the point of usage by all trades.

G. Temporary Sanitary Facilities

Provide temporary toilet facilities as required. Maintain these during the entire period of construction under this Contract for the use of all construction personnel on the job. Enough chemical toilets shall be provided to conveniently serve the needs of all personnel. Chemical toilets and their maintenance shall meet the requirements of State and local health regulations and ordinances.

H. Temporary Pumping and Site Drainage

CONTRACTOR shall keep the site free from water at all times to permit continuous access and to prevent damage to the work.

I. Material Hoists and Cranes

1. Provide material hoists required for normal use by all trades and employ skilled hoist operators. Provide all necessary guards, signals, safety devices, etc., required for safe hoist operation. The construction and operation of material hoists shall be in accordance with the applicable ANSI Standards, the "Manual Code of Accident Prevention in Construction" of the Associated General Contractors of America, OSHA, and of other Federal, State, and municipal codes or ordinances. The CONTRACTOR shall prohibit the use of hoists for transporting personnel. Hoists shall be located to avoid risk of damage to completed work.

2. Special rigging and hoisting facilities shall be provided by each trade requiring their use.

J. Temporary Runways, Scaffolding, and Ladders

1. Provide temporary ladders, ramps, and runways as required for performance and inspection of the work. The above facilities shall be constructed and maintained in accordance with the applicable Federal, State, and Municipal regulations and codes.

2. Furnish, erect, and maintain all scaffolding required for this work. Scaffolding shall be constructed and maintained in accordance with applicable State and Federal laws and local ordinances. Scaffolding shall be promptly removed after serving its purpose.

3. Structural strength and safety of scaffolding, runways, covers, railings, ladders, stairs, etc., and compliance with law shall be the sole responsibility of the CONTRACTOR.

K. Temporary Chutes

No materials shall be dropped from structures except through enclosed wooden or metal chutes which shall be provided and maintained as required for the performance of the work by the various trades.

L. Security

Full time watchmen will not be specifically required as a part of the Contract, but the CONTRACTOR shall provide inspection of work area daily and shall take whatever measures are necessary to protect the safety of the public, workmen, and materials, and provide for the security of the site, both day and night.

M. Access Roads and Parking Areas

1. Construct temporary roadways and parking areas within the site as required to provide proper access to the site for delivery of material and equipment of all trades.

2. At completion of the Work or when directed by the ENGINEER, surfacing and sub-base material used for the temporary road and parking areas shall be removed, unless otherwise approved by the ENGINEER.

N. Dust and Mud Control

Take all necessary precautions to control dust and mud associated with the work of this Contract, subject to the approval of the ENGINEER. In dry weather, spray dusty areas daily with water in order to control dust. Take necessary steps to prevent the tracking of mud onto adjacent streets and highways.

O. Traffic Regulation

1. CONTRACTOR shall be responsible for any necessary protection and maintenance of traffic for the construction by the proper use of barricades, warning lights, flares, and necessary traffic control and safety devices, and shall conform to Federal, State, and Local regulations regarding their use.

2. All forms of traffic control on public roadways required by the construction operations shall be in accordance with the Manual of Uniform Traffic Control Devices for Streets and Highways, the Florida Department of Transportation Work Zone requirements and Guidelines, Traffic Control for Highway Construction, and Maintenance Operations.

P. Contractor's Field Office and Storage Sheds

CONTRACTOR shall provide field office and storage sheds as required for the performance of the Work and protection of materials and equipment.

1. CONTRACTOR shall provide space in the field office for the for the OWNER's or ENGINEER's use during the construction contract. This trailer will serve as a field office and shall contain a separate phone line, fax and copy machine, desk, chair and water for OWNER or ENGINEER to use during construction.

2. CONTRACTOR shall not only provide and pay for the trailer, but shall also provide and pay for the telephone lines and their monthly bills, lavatory supplies, monthly electric bill, weekly service of the sanitary facilities, water hook up, connection fees, once per week cleaning of the trailers, plus all associated bills and fees for the trailer and its contents. The mobile office trailer and exterior stairs shall meet all Federal, State, and local laws and shall comply with Health Department regulations.

2. Contractor Field Office must be fully operational prior to the first pay application being processed.

Q. Owner Trailer

1. Owner Trailer:

a. Trailer should be single-width, 400 sq ft. at a minimum, and shall include two offices (one in each end), as well as a reception area, restroom, and conference hall.
b. Air Conditioning and heating
c. VTC flooring
d. Window blinds in all windows
e. Office-cleaning services shall be provided on a weekly basis for the duration of the project.
f. Parking areas for county vehicles shall be provided. No contractor

employees or equipment parking will be permitted in Owner parking areas.

R. Removal of Temporary Construction

Remove the various temporary facilities, services, and controls and legally dispose of them as soon as the ENGINEER deems permissible. Portions of the site used for temporary facilities shall be properly reconditioned and restored to a condition acceptable to the ENGINEER.

1.03 Materials and Equipment

A. Transportation and Handling

1. Manufactured materials and products shall be delivered to the project site as needed for installation, undamaged, in original packages, containers, or bundles, as packaged by the manufacturer with manufacturer's name, brand, seals, and labels intact.

2. Materials other than those designated within the Specifications or approved by the ENGINEER shall not be delivered to the project site.

B. Storage and Protection

CONTRACTOR shall be responsible for protection and preservation of all materials until final acceptance of the Project. Any damage to work prior to acceptance shall be remedied by the CONTRACTOR at no additional cost to the OWNER.

C. Protection of Completed Work

Provide temporary weather-tight enclosures to protect work from damage by the elements, and protect finished surfaces to prevent any damage resulting from the work of any trade.

1.04 Submittals

A. Prior to installation of construction facilities and temporary controls, submit the following items for review and approval:

B. Maintenance of Traffic Plan - show all proposed barricades, signs, markings, and temporary construction, identify sequencing.

C. Project identification sign - provide proposed text, layout, and sizing of all required signs.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01550

MAINTENANCE OF TRAFFIC

PART 1 GENERAL

1.01 Section Includes

Traffic and dust control

1.02 Related Sections

Section 01520 – Temporary Facilities & Controls

1.03 Definitions

The term "Maintenance of Traffic" as used herein, shall include all facilities, devices, traffic control personnel, and operations as are required for the safety and convenience of the public as well as for minimizing public nuisance.

1.04 References

A. Florida Department of Transportation Roadway and Traffic Design Standards

B. Manual on Uniform Traffic Control Devices

C. Right of Way Utilization Regulations, Orange County, Florida, latest edition.

1.05 Submittals

CONTRACTOR shall provide a traffic control plan. Include proposed signs, markings, barricades, detour routes, sequencing, and phasing for vehicular and pedestrian traffic routes during construction. Plan will require Orange County approval.

1.06 Qualifications

CONTRACTOR shall provide a Worksite Traffic Supervisor who is responsible for initiating, installing, and maintaining all Maintenance of Traffic requirements as required by the Contract Documents and jurisdictional agencies. CONTRACTOR shall ensure that the Worksite Traffic Supervisor is certified by a Florida Department of Transportation approved training agency, which meets the Florida Department of Transportation's maintenance of traffic training requirement for advanced training. Use approved alternate Worksite Traffic Supervisors when necessary.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 Site Preparation

A. Contact property owners affected by construction. Coordinate temporary driveway closures and sequencing. Maintain access for all property owners during construction.

B. Remove existing pavement markings and remove or relocate existing signs as necessary to implement traffic control.

C. Install signs, markings, and barricades in accordance with approved traffic control plan.

D. Implement lane closures in accordance with the parameters shown on the Drawings and in the approved traffic control plan.

E. Perform work in a manner that will cause minimum interruptions to traffic.

F. Place excavated material outside roadway clear zones, and away from pedestrian facilities.

G. All trenches shall be backfilled each day prior to the completion of construction activities.

H. Where special hazards exist, install traffic control through the use of lighted concrete barriers, barricades, or other such traffic control facilities as needed to ensure public safety.

3.02 Maintenance

A. Inspect traffic control devices on a daily basis to ensure placement of barricades and function of lights is maintained throughout construction.

B. Wet unstabilized areas as necessary to control dust.

C. Adjust traffic control devices as required under emergency conditions.

END OF SECTION

SECTION 01630

PRODUCT SELECTION AND SUBSTITUTION PROCEDURES

PART 1 GENERAL

1.01 Section Includes

Product selection procedures.

1.02 Product Selection

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

B. To the fullest extent possible, provide products of the same kind from a single source.

C. Compatibility among product options is required. Where more than one choice is available as options during product selection, select an option which is compatible with other products and materials already selected.

D. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

E. Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects and are approved for use and listed in the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

F. Where Contract Documents are at variance with specific manufacturer's details and installation procedures, contact ENGINEER for resolution prior to start of work.

G. For products specified by reference standards only, the CONTRACTOR may provide any product complying with the specified standard that is included as an approved material in the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

1.03 Substitutions

A. Intent of these Specifications is to provide the OWNER with a quality facility without discouraging competitive bidding. Substitutions may be submitted and will be evaluated as specified herein.

B. If the CONTRACTOR wishes to provide a product other than one named in the

Specifications, he shall submit sufficient information to the ENGINEER for evaluation and determination of acceptability of the product prior to Bid Opening.

C. CONTRACTOR is responsible for obtaining information required by the ENGINEER for the evaluation of products. The ENGINEER is responsible for determination of the equality of products, and his decision shall be final, except as otherwise provided by law and funding agency regulations.

D. Substitution requests can be made after Bid Opening when:

1. A specified product is no longer available

2. The product cannot be delivered by the manufacturer in a timely manner

3. The product is found to be incompatible with other specified products

4. Proposed substitutions will yield a cost savings to the OWNER

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01720

PROJECT RECORD DOCUMENTS AND SURVEY

PART 1- GENERAL

1.01 PURPOSE AND DESCRIPTION OF WORK

A. The purpose of the Project Record Documents is to provide the County with factual information regarding all aspects of the Work, both concealed and visible, to enable future location, identification and modification of the Work without lengthy and expensive site measurement, investigation or examination.

B. Provide professional surveying and mapping work required for the execution of the contract, including verification of existing survey data, construction layout, and production of the As-Built Drawings. This Work shall be performed by a Surveyor that is licensed by the State of Florida as a professional surveyor and mapper pursuant to Chapter 472, F.S.

C. Location of the constructed improvements as depicted in the contract drawings is required. To verify the As-Built Drawing accuracies and to insure the Work was constructed in conformance with the contract drawings, the following survey documents are required to be certified by the Surveyor.

1. As-Built Asset Attribute Data Table,
2. Force Main Table,
3. Pipe Deflection Table, and
4. Boundary Survey and Survey Map Report for any easements that have constructed pipes within and monuments that were replaced.
5. As-built drawings shall be the same as the design plans with plan and profile information provided.

1.02 DEFINITIONS

Except where specific definitions are used within a specific section, the following terms, phrases, words and their derivation shall have the meaning given herein when consistent with the context in which they are used. Words used in the present tense include the future tense, words in the plural number include the singular number and words in the singular number include the plural number. The word "shall" is mandatory, and the word "may" is permissive.

A. **As-Built Drawings:** Drawings prepared by the CONTRACTOR's Surveyor shall depict the actual location of installed utilities for the completed WORK in a full size hard copy and an electronic AutoCAD file (dwg) format.

B. **Record Drawings:** Drawings, prepared by prepared and certified by the County's Consultant Engineer, shall be a compiled representation of the constructed project, a listing of the sources and the basis of information used in the preparation of the

"record drawings", the constructed project meets the ENGINEER's design intent and note the material deviations from the design documents, and the accuracy of the location information is based upon the CONTRACTOR's surveyor data supplied in the tables (As-Built Asset Attribute Data, Gravity Main, and Pipe Deflection).

C. **Boundary Survey:** Boundary survey, map and report certified by a Surveyor shall be provided that meets the requirements of Chapter 61G17-6 'Minimum Technical Standards', FAC.

D. **Surveyor:** CONTRACTOR's Surveyor that is licensed by the State of Florida as a professional surveyor and mapper pursuant to Chapter 472, F.S.

E. **Survey Map Report:** As a minimum the Survey Map Report shall identify any corners that had to be reset, measurements and computations made, pump station boundary issues, and accuracies obtained.

1.03 QUALIFICATIONS OF THE SURVEYOR

A. The Surveyor, who is proposed by the CONTRACTOR to provide services for the Project, is subject to the approval of the County. Prior to any services being performed, the CONTRACTOR shall submit the name and address of any proposed Surveyor and a written acknowledgement from the Surveyor stating that he has the hardware, software and adequate scope of services in his agreement with the CONTRACTOR to fully comply with the requirements of this specification. These submittals shall be provided to the County prior to Notice to Proceed. The County recommends that the Surveyor attend the Preconstruction meeting. Any Surveyor, who has not previously performed work for the County in the past, shall attend the Preconstruction meeting.

1.04 RELATED REQUIREMENTS

A. All General Conditions, Supplements to the General Conditions, and any Addenda issued by the County are a part of this Section in the same manner as if fully written herein, and shall govern the Work of this Section, except where more stringent articles or requirements are stipulated, then they shall govern this Section.

B. Contract Documents are complementary and what is required by anyone shall be as binding as if required by all.

C. Other requirements affecting Record Documents may appear in pertinent other sections of these specifications.

D. All as-builts shall be submitted in accordance as specified herein and in accordance with Section Orange County Utilities Standards and Construction Specifications Manual.

1.05 QUALITY ASSURANCE

A. Delegate the responsibility for maintenance of the Record Documents to one person on the CONTRACTOR's staff as approved by the County.

B. Thoroughly coordinate changes within the Record Documents, making adequate and proper entries on each page of specifications and each sheet of drawings and other documents where such entry is required to show progress and changes properly.

C. Make entries within 24-hours after receipt of information has occurred.

D. Survey documents shall comply with the minimum technical standards of Chapter 61G17-6 of the Florida Administrative Code (FAC) and Table 01720-1 Minimum Survey Accuracies specified in, whichever are more stringent. Asset attribute data shall be signed, sealed and dated by the Surveyor. All coordinates shall be geographically registered in the Florida State Plan Coordinate System using the contract drawings control points for horizontal and vertical controls.

Table 01720-1
Minimum Survey Accuracies

Asset/Location	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: horizontal center and vertical top, unless otherwise specified
Bench Marks	N/A	0.01	Point
Baseline Control Locational Accuracy	0.01	N.A	Point
Tract and Easements Corners	*	N/A	Survey Monuments
Mains at 100' max. intervals	0.1	0.1	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing
Fittings, Sleeve, Tapping Saddle, and end of the pipe if Plugged or Capped.	0.1	0.1	Fitting
Restrained Pipe	0.1	N/A	Restrained Joint Limits
Connections	0.1	0.1	Pipe
Bore and Jack Casing	0.1	0.1	Top pf Casing at the Casing Limits
Directional Drill	0.1	0.1	10ft intervals during the directional drill operation
Hydrants	0.1	N/A	Operating Nut
Valves	0.1	0.1	Operating Nut and Valve Body
Air Release Valves, Blow-off, and Backflow Valves	0.1	N/A	Valve Enclosure
Master Meters, Deduct Meters, and Wastewater Meters	0.1	N/A	Register
Meter Box	0.1	N/A	Top of Meter Box
Clean-out	0.1	N/A	Top of Clean-out
Manhole Rim	0.1	0.1	Manhole
Manhole Inverts	N/A	0.01	Pipe Inverts
Pump Station	0.1	0.01	Wet Well and Pipe Inverts
Demolished Pipe	0.1	0.1	Limits of Abandoned or removed pipe
Existing Utilities water, wastewater, reclaimed water, and appurtenant structures. **	0.1	0.1	Pipe or structure

* Shall conform to the requirements of the "Chapter 5J-17, "Minimum Technical Standards', FAC", certified by a Surveyor.

** Within the limits of construction and shall also include storm water pipes if the Water Main crosses the storm sewer.

1.06 SUBMITTALS

A. Comply with pertinent provisions for the timely submittal requirements under this article and specification section.

B. Prior to submitting a monthly payment application, the CONTRACTOR's progressive As-Built Drawings and tables (As-Built Asset Attribute Data, Gravity Main, and Pipe Deflection) shall be acceptable to the County.

C. Progressive As-Built Drawings which will indicate the horizontal and vertical locations of all current constructed improvements with sufficient information and notes to easily determine if the improvements were constructed in conformance with the Contract Documents. The progressive As-Built Drawings shall include a Surveyor's certified statement regarding the constructed improvements being within the specified accuracies or if not indicating the variances, as described in Table 01720-1 Minimum Survey Accuracies. The CONTRACTOR shall also submit the following updated monthly tables certified by the Surveyor:

D. Prior to submitting a request for final payment or County issuing a Certificate of Completion for the Work, CONTRACTOR shall submit the final Record Documents to the County for approval. Retainage funds will be withheld at the County's discretion based on the quality and accuracy of the final Record Documents.

E. Prior to the County submitting for FDEP clearance or partial clearance to place a main in service, the complete as-builts for those specific segments need to be submitted and approved by the ENGINEER prior to submission to the FDEP. CONTRACTOR shall allow for ten days for review of as-builts.

1.07 RECORD DOCUMENTS AT SITE

A. Maintain at the site and always available for County's use one record copy of:

1. Construction Contract, Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents.
2. Change Orders, Verbal Orders, and other modifications to Contract.
3. Written instructions by the County as well as correspondence related to Requests for Information (RFIs).
4. Accepted Shop Drawings, Samples, product data, substitution and "or-equal" requests.
5. Field test records, inspection certificates, manufacturer certificates and construction photographs.
6. Progressive As-Built Drawings
7. Current Surveyor's tables for the As-Built Assets Attribute Data, pipe deflection data, and gravity main data.

B. Maintain documents in an organized, clean, dry, legible condition and completely protected from deterioration and from loss and damage until completion of the Work, transfer of all record data to final Record Documents and for submittal to the County.

PART 2- PRODUCTS

2.01 AS-BUILT DRAWINGS

A. Maintain the electronic As-Built Drawings to accurately record progress of Work and change orders throughout the duration of the Contract.

B. Date all entries. Enter RFI No., Change Order No., etc. when applicable.

C. Call attention to the entry by highlighting with a "cloud" drawn around the area affected.

D. In the event of overlapping changes, use different colors for entries of the overlapping changes.

E. Design call-outs shall have a thin strike line through the design call-out and all As-Built information must be labeled (or abbreviated "AB") and be shown in a bolder text that is completely legible.

F. Make entries in the pertinent other documents while coordinating with the ENGINEER and the County for validity.

G. Entries shall consist of graphical representations, plan view and profiles, written comments, dimensions, State Plane Coordinates, details and any other information as required to document field and other changes of the actual Work completed. As a minimum, make entries to also record:

1. Depths of various elements of foundation in relation to finish floor datum and State Plane Coordinates and elevations.
2. Plan view and profile drawings: State Plane coordinates and elevations or depths for all assets shown in the Asset Attribute Data Table on each drawing if the fittings, valves, appurtenances, etc. are shown on that drawing sheet.
3. When electrical boxes, or underground conduits and plumbing are involved as part of the Work, record true elevations and locations, dimensions between boxes.
4. Actually installed pipe or other Work materials, class, pressure rating, diameter, size, specifications, etc. Similar information for other encountered underground utilities, not installed by CONTRACTOR, their owner and actual location if different than shown in the Contract Documents.
5. Details, not on original contract Drawings, as needed to show the actual location of the Work completed in a manner that allows the County to find the detail in the future.

6. CONTRACTOR shall mark all arrangements of conduits, circuits, piping, ducts and similar items shown schematically on the construction documents and show on the As-Built Drawings the actual horizontal and vertical alignments and locations.

7. Major architectural and structural changes including relocation of doors, windows, etc. Architectural schedule changes according to CONTRACTOR's records and shop drawings.

2.02 RECORD DOCUMENTS

A. A full size, two (2) hard copy set of the final Record Documents and shall include all of the documents described below under this subsection 2.02.

B. The following documents shall be signed and sealed by the Surveyor:

1. As-Built Asset Attribute Data Table (see Table 1720-2 for an example or refer to Section 3111 of the Orange County Standards and Construction Specifications Manual). The required asset table is available for download at http://www.orangecountyfl.net/YourLocalGovernment/CountyDepartments/Utilities/StandardsConstructionSpecificationsManual.aspx.

2. Survey and Survey Map Report for the location of constructed pipes within any easements and right-of-way. As a minimum, the Survey Map Report shall identify or describe the locations where the pipe centerline was constructed within three feet of the easement or right-of-way boundary, where the pipe was constructed outside the easement or right-of-way boundary, any corners that had to be reset, measurements and computations made, pump station boundary issues, and accuracies obtained. Survey map report shall be dated after the Work within the right-of-ways or easements have been completed.

3. Force Main Table

4. Pipe Deflection Table (see Table 1720-3 for an example). *A copy of the required table is available for download at:* http://www.orangecountyfl.net/YourLocalGovernment/CountyDepartments/Utilities/StandardsConstructionSpecificationsManual.aspx.

C. Digital Set of the final Record Documents including but not limited to:

1. Scanned digital copies of the final As-Built Drawings.

2. Electronic Survey documents electronically sealed by the Surveyor.

3. Final Record Documents information.

4. Digital As-Built Drawing in the Engineer's current version of AutoCAD file (dwg) format for the Contract Drawings, updated to match the final Record Drawing information.

D. Pump station site Boundary Survey and Map Report.

E. New Boundary Survey to re-establish easement corners, right-of-way monuments, or pump station site corners with monuments if destroyed by the Work.

F. Scanned Documents: Scan the Survey Documents and other Record Documents reflecting changes from the Bid Documents.

G. Scanned As-Built drawing sets shall be complete and include the title sheet, plan/profile sheets, cross-sections, and details. Each individual sheet contained in the printed set of the As-Built Drawings shall be included in the electronic drawings, with each sheet being converted into an individual tif (tagged image file). The plan sheets shall be scanned in tif format Group 4 at 400 dpi resolution to maintain legibility of each drawing. Then, the tif images shall be embedded into a single pdf (Adobe Acrobat) file representing the complete plan set. Review all Record Documents to ensure a complete record of the project.

H. Provide an encompassing digital AutoCAD file that includes all the information of the As-Built Drawings and any other graphical information in the As-Built Drawings. The Drawings shall include the overall Work, utility system layout and associated parcel boundaries and easements. Feature point, line and polygon information for new or altered Work and all accompanying geodetic control and survey data shall be included. The surveyor's certified as-built asset attribute data shall be added to the As-Built Drawings and Surveyor shall electronically seal the data in a comma-delineated ASCII format (txt).

TABLE 1720-2

Asset Attribute Data Form Examples

General Information Worksheet

	A	B	C
1	**Date of submittal**	3/3/2009	
2			
3	**Collection Date**	3/3/2009	
4			
5	**Project Number**	123456	
6			
7	**Project Name**	ABC	
8			
9	**Contractor Name**	Joe Contractor	
10			
11	**Company**	Your Company	
12			

General Info / Hydrants / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Hydrants Worksheet

	A	B	C	D	E	F	H	I
1	**ID Number**	**Utilities Asset Number**	**Easting**	**Northing**	**Elevation**	**Service Type**		
2	1	H001	535896.7840	1491359.5830	99.78	Water		
3	2	H002	536062.0800	1491360.9250	99.20	Water		
4	3	H002	509643.9000	1481344.6000	99.20	Water		

General Info / **Hydrants** / Valve / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Valves Worksheet

	B	C	D	E	F	G
1	**Utilities Asset Number**	**Easting**	**Northing**	**Elevation**	**Valve Type**	**Service Type**
2	V001	535887.9950	1491394.7730	96.74	Gate	Water
3	V002	535884.7480	1491396.1010	91.27	Gate	Water
4	V003	535883.6870	1491393.4900	92.18	Gate	Water

General Info / Hydrants / **Valve** / Manhole / Meter / Fitting / Cleanout / Pipes / Structures / Easements

Manhole Worksheet

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1	**ID Number**	**Utilities Asset Number**	**Easting**	**Northing**	**Elevation**	**Invert Elv N**	**Invert Elv NE**	**Invert Elv E**	**Invert Elv SE**	**Invert Elv S**	**Invert Elv SW**	**Invert Elv W**	**Invert Elv NW**	**Service Type**
2	15	15	535898.3040	1491144.0450	96.31	91.56	88.81			88.71		88.61		Water Reclamation
3	277	277	505962.0207	1474906.7832	92.76		86.83				86.85			Water Reclamation
4	278	278	506130.5461	1475093.6556	91.00				85.95		86.17		87.2	Water Reclamation
5	279	279	505993.3960	1475243.3448	92.36				88.8					Water Reclamation

General Info / Hydrants / Valve / **Manhole** / Meter / Fitting / Cleanout / Pipes / Structures / Easements / Lookup / Relation

Meter Worksheet

	A	B	C	D	E	F	G
1	**ID Number**	**Utilities Asset Number**	**Easting**	**Northing**	**Elevation**	**Meter Type**	**Service Type**
2	7	7	535887.9950	1491394.7730	96.74	Flow	Water

General Info / Hydrants / Valve / Manhole / **Meter** / Fitting / Cleanout / Pipes / Structures / Easements

Fitting Worksheet

	A	B	C	D	E	F	G
1	**ID Number**	**Utilities Asset Number**	**Easting**	**Northing**	**Elevation**	**Fitting Type**	**Service Type**
2	20008	F0001	538549.20	1475457.69	78.94	Tee	Water Reclamation
3	20010	F0002	538544.73	1475457.74	78.94	Tee	Water Reclamation
4	20013	F0003	538544.36	1475467.92	79.02	Tee	Water Reclamation

General Info / Hydrants / Valve / Manhole / Meter / **Fitting** / Cleanout / Pipes / Structures / Easements

Cleanout Worksheet

	A	B	C	D	E	F	H
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Service Type	
2	15	15	535898.3040	1491144.0450	96.31	Water Reclamation	
3	277	277	505962.0207	1474906.7832	92.76	Water Reclamation	

General Info | Hydrants | Valve | Manhole | Meter | Fitting | **Cleanout** | Pipes | Structures | Easements

Pipes Worksheet

	A	B	C	D	E	F	G	H	I
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	W Pipe Type	WW Pipe Type	RW Pipe Type	Service Type
2	20001	P00001	1475448.92	538024.96	81.5	Distribution	Pressurized		Water Reclamation
3	20002	P00002	1475487.58	538055.74	79.74	Distribution	Pressurized		Water Reclamation
4	20004	P00003	1475470.75	538166.01	79.46	Distribution	Pressurized		Water Reclamation

General Info | Hydrants | Valve | Manhole | Meter | Fitting | Cleanout | **Pipes** | Structures | Easements

Structures Worksheet

	A	B	C	D	E	F	G
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation	Structure Type	Service Type
2	20	3980	535886.9150	1491144.3200	96.17	PumpStation	Water Reclamation

General Info | Hydrants | Valve | Manhole | Meter | Fitting | Cleanout | Pipes | **Structures** | Easements

Easements Worksheet

	A	B	C	D	E	F	G
1	ID Number	Utilities Asset Number	Easting	Northing	Elevation		
2	1721	1721	468066.6800	1515018.8300			
3	1722	1722	468066.9400	1514983.8300			
4	1723	1723	468041.9400	1514983.6500			
5	1724	1724	468041.9400	1515018.6400			

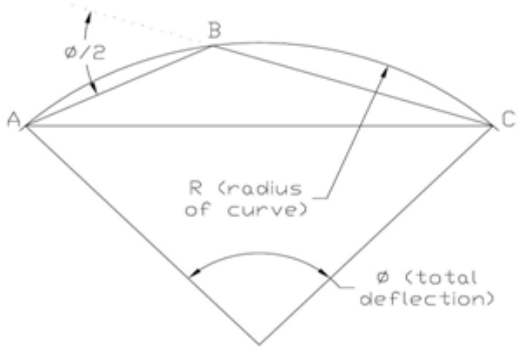
Hydrants | Valve | Manhole | Meter | Fitting | Cleanout | Pipes | Structures | **Easements**

Note: Do not fill out Utilities Asset Number (grey) column.

TABLE 01720-3

PIPE DEFLECTION TABLE EXAMPLE

Project:			
Contractor:			
Progress Mtg Date:			
Contract #			
Dwg Sheet #			
Utility Type		FM	
Pipe Manufacturer		National Pipe	
Pipe size & material		16" PVC C905	
PVC Manufacturer Deflection		6	inches
County Allowable Deflection	75%	4.5	inches
Allowable Angle of Offset		1.5	degrees
Allowable Radius of Curvature		764	feet
Laying Length of Pipe		20	feet



ID	Size and Type	Northing	Easting	Elev.	Calculations Including Elevation (XYZ)						
					Distance between points AB	Distance between points BC	Distance between points AC	Total Deflection Ø*	Radius of Curve**	Average Offset Angle***	Average Offset****
					Length AB	Length BC	Length AC	XYZ (w/ elevation)	XYZ (w/ elevation)	per laying length	per laying length
					ft	ft	ft	degrees	ft	degrees	inches
14041	16" FM	1505131.50	468948.53	107.68	-	-	-	-	-	-	-
7000	16" FM	1505059.60	468932.08	108.15	73.76	38.93	112.66	5.48	1,178.35	0.97	4.07
2128	16" FM	1505022.11	468921.60	108.55	38.93	39.61	78.54	2.29	1,961.65	0.58	2.45
2127	16" FM	1504983.85	468911.35	108.29	39.61	38.35	77.96	1.78	2,505.50	0.46	1.92
2126	16" FM	1504946.67	468901.96	107.81	38.35	39.13	77.42	8.79	505.16	2.27	9.51
2125	16" FM	1504908.11	468895.31	107.48							

Data that has be inputted

Values in yelloware over spec

*Uses lawof cosines to determine angle ABC and Ø.
angle ABC = arccos((AB²+BC²-AC²)/(2*AB*BC))
180-Ø/2 = angle ABC
Calculate the total deflection Ø.
to the outer point (A or C) is equal in angle to
the approach from the next point along the

** Uses lawof sines, using the chord length AC and radius R.
Since sin((Ø/2)*(PI/180))=(Chord/2)/R and length AC=Chord
R=AC/(2*sin(Ø*PI/360)
This calculation assumes an average radius over the bend between three points.

*** Adds the lengths of AB + BC /20ft to get an approximate number of bends over the span.
This value is divided by the total deflection
angle to calculate the average bend angle of
This assumes that the bend angle consistent across the entire length.

**** Uses average offset angle and laying length of pipe.

PART 3- EXECUTION

3.01 SURVEY FIELD WORK

A. Locate, reference, and preserve existing horizontal and vertical control points and property corners shown on the Drawings prior to starting any construction Work. If the Surveyor performing the Work discovers any discrepancies that will affect the Project, the CONTRACTOR must immediately report these findings to the County. All survey work shall meet the requirements as defined in Florida Administrative Code 61G17-6. Reference and preserve all survey points during construction. CONTRACTOR's Surveyor is responsible to reset the points at the CONTRACTOR's expense, if survey points are disturbed. Copies of the Surveyor's field notes and/or electronic files for point replacement shall be provided to the County.

1. Surveyor shall locate all improvements for the project As-Built Asset Attribute Data using State Plane Coordinates as the horizontal datum and the benchmark referenced on the Drawings as the vertical datum. The County's Engineer will provide electronic files of the Drawings to be used by the Surveyor in complying with these specifications.

2. Construction layout shall be established from the reference points shown or listed on the Drawings. The accuracy of any method of staking shall be the responsibility of the CONTRACTOR. All construction layout staking shall be done such as to provide for easy verification of the Work by the County.

B. Use survey control points to layout such work tasks as the following:

1. Clearing, grubbing, work limits, right-of-way lines and easements

2. Locations for pipelines and all associated structures and appurtenances

C. Surveyor shall reference and replace any project control points, boundary corners, benchmarks, section corners, and right-of-way monuments that may be lost or destroyed, at no additional cost to the County. Establish replacement points based on the original survey control. Copies of all reference field notes and/or electronic files for point replacement shall be submitted to the County.

3.02 CONSTRUCTION PROGRESS MEETINGS

A. CONTRACTOR shall provide progressive and a final version of the Record Documents both as paper copies and electronic format described below.

1. Construction Contract, As-Built Drawings, Specifications, General Conditions, Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract Documents.

2. Specifications and Addenda: Record manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed as well as any changes made by Field Order, Change Order or other.

3. Change orders, verbal orders, and other modifications to Contract.

4. Written instructions by the County as well as correspondence related to Requests for Information (RFIs).
5. Accepted Shop Drawings, samples, product data, substitution and "or-equal" requests.
6. Field test records, inspection certificates, manufacturer certificates and construction photographs.

B. Progressive record documents shall include the following updated monthly tables certified by the Surveyor:

1. As-Built Asset Attribute Data Table: Surveyor shall obtain field measurements of vertical and horizontal dimensions of constructed improvements. The monthly submittal shall include the Surveyor's statement regarding the constructed improvements being within the specified accuracies as described in Table 01720-1 Minimum Survey Accuracies or if not, indicating the variances.
2. Gravity Main Table: Surveyor shall prepare and update a Gravity Main Table to include as a minimum the pipe segment identification, pipe lengths, manhole inverts and tops, and slopes for gravity mains. Surveyor shall certify the data entered are correct and indicate if the minimum slopes have not been met.
3. Pipe Deflection Table: Surveyor shall input the type of pipe, pipe manufacturer, PVC manufacturer deflection allowance, allowable angle of offset and radius of curvature, laying length of pipe, and coordinates. Surveyor shall certify the data entered are correct and indicate if the deflection allowance, offset or radius of curvature exceeds the manufacturer's recommendations. *County will provide an electronic version of a blank table that shall be used to input the data.*

3.03 FINAL RECORD DOCUMENTS SUBMITTAL

A. Submit the Final Record Documents within 20 days after Substantial Completion.

1. Participate in review meetings as required and make required changes and promptly deliver Final Record Documents to ENGINEER and County.

3.04 STORAGE AND PRESERVATION

A. Store Record Documents and samples at a protected location in the project field office apart from documents used for construction.

1. Provide files and racks for storage of documents
2. Provide locked cabinet or secure space for storage of samples.

B. File documents and samples in accordance with CSI format with section numbers matching those in the Contract Documents.

C. In the event of loss of recorded data, use means necessary to again secure the data to the County's approval.

1. Such means shall include, if necessary in the opinion of the County, removal and replacement of concealing materials.
2. In such cases, provide replacements of the concealing materials to the standards originally required by the Contract Documents.

END OF SECTION

SECTION 01750

CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 Section Includes

Substantial completion requirements, clean-up, final completion requirements, closeout submittals

1.02 Clean-Up Operations

A. Entire project site shall be thoroughly cleaned at the completion of the work.

B. CONTRACTOR shall be responsible for the removal of excess dust and mud created by the construction project from all sidewalks, streets, and highways as directed by the OWNER. Equipment to clean these surfaces shall be subject to approval by the OWNER.

1.03 Substantial Completion Requirements

A. Complete the following before requesting the inspection for certification of substantial completion.

1. Submit as-built drawings.

2. Deliver tools, spare parts, extra stocks of material and similar physical items to the OWNER.

3. Complete required cleaning and testing of systems, and instruction of the OWNER'S operating and maintenance personnel. Discontinue or change over and remove temporary facilities and services from the project site, along with construction tools and facilities, mock-ups, and similar elements.

4. Complete final cleaning up requirements, including touch-up painting of marred surfaces.

5. Touch-up and otherwise repair and restore marred exposed finishes.

B. Work is not substantially complete until regulatory agency letters of clearance for placing systems into service are received by the OWNER.

1.04 Closeout Submittals

A. Upon completion of the project, or portions thereof, the CONTRACTOR shall transfer to the OWNER all applicable items accumulated throughout construction. These include but are not limited to the following items:

1. Service manuals, installation instructions, special tools, and specialties.

2. Spare parts ordered as part of this Contract.

3. Submittal of the Material and Workmanship Bond.

4. Submittal of manufacturers' guarantees, bonds, and letters of coverage extending beyond the time limitations of the CONTRACTOR'S guarantee.

5. Delivery of any salvaged or borrowed materials or equipment to the OWNER.

6. Record documents of completed facilities, including certified copy of the survey.

7. All keys to all doors, gates, and equipment.

8. Checklist indicating satisfactory completion of all unfinished items from the final inspection.

9. Waivers of lien.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 02220

SITE DEMOLITION

PART 1 GENERAL

1.01 Section Includes

A. Demolition of designated existing force main and sidewalk, and removal of materials from project site.

B. Demolition and removal of pavements, curbs and gutters, utilities, signage or landscaping.

C. Disconnecting and capping or removal of identified utilities.

D. Filling voids in subgrade created as a result of removals or demolition.

E. Disposal of demolished materials.

1.02 Related Sections

A. Section 02230 - Site Preparation

B. Section 02310 - Finish Grading

C. Section 02320 – Trenching, Bedding and Backfilling

1.03 Regulatory Requirements

A. Conform to applicable State and local codes for demolition of existing utilities or features, safety of adjacent structures, dust control, and runoff control.

B. Obtain required permits and licenses from appropriate authorities. Pay associated fees including disposal charges.

C. Notify affected utility companies before starting work and comply with their requirements.

D. Do not close or obstruct roadways, sidewalks, or fire hydrants without appropriate permits.

E. Conform to applicable regulatory procedures when hazardous or contaminated materials are discovered.

1.04 Project Record Documents

Accurately record actual locations of capped utilities and subsurface obstructions that will remain after demolition.

1.05 Project Conditions

A. Structures to be demolished will be discontinued in use and vacated prior to start of work.

B. OWNER assumes no responsibility for condition of structures to be demolished.

C. Conditions existing at time of inspection for bidding purposes will be maintained by OWNER as practicable. Variations within structures may occur by OWNER'S removal and salvage operations prior to start of demolition work.

D. Unless otherwise indicated in Contract Documents or specified by the OWNER, items of salvageable value to CONTRACTOR shall be removed from site and structures. Storage or sale of removed items on site will not be permitted and shall not interfere with other work specified in Contract Documents.

E. Explosives shall not be brought to site or used to demolish structures.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 Preparation

A. Provide, erect, and maintain erosion control devices, temporary barriers, and security devices at locations indicated on Construction Drawings.

B. Protect existing landscaping materials, appurtenances, and structures which are not to be demolished. Repair damage caused by demolition operations at no cost to OWNER.

C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as needed.

D. Mark location of utilities. Protect and maintain in safe and operable condition utilities that are to remain. Prevent interruption of existing utility service to occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities as acceptable to governing authorities and OWNER.

3.02 Demolition Requirements

A. Conduct demolition to minimize interference with adjacent structures or pavements.

B. Cease operations immediately if adjacent structures appear to be in danger. Notify authority having jurisdiction. Do not resume operations until directed by authority.

C. Conduct operations with minimum of interference to public or private access. Maintain ingress and egress at all times.

D. Obtain written permission from adjacent property owners when demolition equipment will traverse, infringe upon, or limit access to their property.

E. Sprinkle work with water to minimize dust as necessary. Provide hoses and water connections for this purpose.

F. Comply with governing regulations pertaining to environmental protection.

G. Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

H. Plans identify items to be demolished. Include incidental demolition to completely remove structures whether indicated on plan or not.

3.03 Demolition

A. Demolish buildings completely and remove from site using methods as required to complete work within limitations of governing regulations. Small structures may be removed intact when acceptable to OWNER and authorities having jurisdiction.

B. Locate demolition equipment and remove materials so as to prevent excessive loading to supporting walls, floors, or framing.

C. Demolish concrete and masonry in small sections. Break up concrete slabs-on-grade that are 2-feet or more below proposed subgrade. Remove slabs-on-grade and below grade construction within 2-feet of proposed subgrade.

3.04 Filling Voids

A. Completely fill below grade areas and voids resulting from demolition or removal of structures, underground fuel storage tanks, wells, cisterns, etc., using approved select fill materials consisting of stone, gravel, and sand free from debris, trash, frozen materials, roots, and other organic matter.

B. Ensure that areas to be filled are free of standing water, frost, or unsuitable material, trash, and debris prior to fill placement.

C. Place fill materials in accordance with Section 02320 unless subsequent excavation for new work is required.

D. Grade surface to match adjacent grades and to provide flow of surface drainage after fill placement and compaction.

3.05 Disposal of Demolished Materials

A. Remove from site debris, rubbish, and other materials resulting from demolition operations.

B. No burning of any material, debris, or trash on-site or off-site will be allowed.

C. Transport materials removed from demolished structures with appropriate vehicles and dispose off-site to areas which are approved for disposal by governing authorities and appropriate property owners.

END OF SECTION

SECTION 02230

SITE PREPARATION

PART 1 GENERAL

1.01 Section Includes

A. Layout of work and protection of bench marks.

B. Protection of structures, trees, or vegetation to remain.

C. Clearing and grubbing.

D. Stripping and storing topsoil.

1.02 Related Sections

A. Section 02320 - Trenching, Bedding and Backfilling

B. Section 02370 - Erosion and Sedimentation Control

1.03 Coordination

A. Notify the following utility owners which may have utilities in the project area and coordinate with them to avoid service interruptions and/or safety hazards:

1. Brighthouse
2. Progress Energy
2. MCI
3. Orange County Public Works
4. Orlando-Orange County Expressway Authority
5. AT&T
6. Teco Peoples Gas
7. Traffic Control Devices
8. Comcast Communications

B. Contact Sunshine State, One-Call at 1-800-432-4770, to determine if there are other utilities in the area, and their location.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 Bench Marks and Monuments

Maintain all existing benchmarks, monuments and other reference points; if destroyed, replacement costs will be deducted from payments due the CONTRACTOR.

3.02 Laying Out Work

A. Base lines, property lines, and easement lines, are shown on the Drawings. Benchmarks utilized are also shown on the Drawings. If the bench marks are disturbed as a result of construction activities, reestablish such items by utilizing a Florida licensed surveyor.

B. Stake out the construction, establish lines and levels, temporary bench marks, batter boards, centerlines and reference points for the work, and verify all dimensions relating to interconnection with existing features.

C. Report any inconsistencies in the proposed grades, lines and levels, dimensions and locations to the ENGINEER before commencing work.

D. Unless otherwise directed by the OWNER or ENGINEER, the CONTRACTOR is expected contain all construction activities within the right-of-way, easements, and property secured by the OWNER, as shown on the Drawings. At no time shall the CONTRACTOR disturb surrounding properties or travel on surrounding properties without written consent from the property owner. Any repair or reconstruction of damaged areas in surrounding properties shall be repaired by the CONTRACTOR on an immediate basis. All costs for repairs shall be the responsibility of the CONTRACTOR and no extra compensation shall be provided.

E. CONTRACTOR shall be responsible for locating and protecting and/or relocating all utilities lines, including irrigation lines, in the areas of the construction activities. If any existing lines are broken or damaged as a result of construction activities, the CONTRACTOR shall be responsible for repairing the lines at no additional cost to the OWNER.

3.03 Burning

Burning is not allowed.

3.04 Protection of Trees and Shrubs

A. Existing trees and shrubs within the treatment plant site shall remain unless specifically required to be removed as indicated on the Drawings.

B. Within the right-of-way, easements, and OWNER secured property, the intent is to allow trees and shrubs to remain in accordance with the following schedule: Utility pipeline construction - trees and shrubs to remain outside a 15 foot wide

path, centered on the pipeline.

C. Protect branches, trunks, and roots of trees and shrubs that are to remain. Trees to remain in the construction area shall be boxed, fenced or otherwise protected before any work is started; remove boxing when directed by the ENGINEER. Do not permit heavy equipment or stockpiles within branch spread. Remove interfering branches without injury to trunks and cover scars with tree paint.

D. CONTRACTOR shall assume full responsibility for the protection of all trees and shrubs. CONTRACTOR is responsible for following any ordinance pertaining to Orange County's regulations.

3.05 Relocation of Utilities

A. Active utilities which do not interfere with the work shall be supported and protected from damage. After obtaining the ENGINEER's approval, relocate or remove active utilities which will interfere with work as indicated. Pay for all damage to active utilities and for relocation or removal of all interfering utilities which are ascertainable from Drawings, surveys, site inspection or encountered during construction.

B. Inactive or abandoned utilities and appurtenant structures encountered shall be removed to avoid interference as directed by the ENGINEER. Exposed ends of abandoned lines shall be plugged or capped in a water-tight manner. Any inactive or abandoned utilities shall be shown on the project record drawings.

3.06 Clearing and Grubbing

A. Areas to receive clearing and grubbing shall include all areas to be occupied by the proposed improvements, areas for fill and site grading, and borrow sites. Remove trees outside of these areas only as indicated on the Drawings or as approved in writing by the ENGINEER or OWNER.

B. Clearing shall consist of removing trees and brush and disposal of other materials that encroach upon or otherwise obstruct the work.

C. Exercise extreme care during the clearing and grubbing operations to not damage existing structures, pipes or utilities.

D. Grubbing shall consist of removing and disposing of stumps, roots larger than 2" in diameter, and matted roots. Remove to a depth of not less than 18" below the original surface level of the ground.

E. All combustible debris and refuse from site preparation operations shall be removed to legal off-site disposal areas.

3.07 Topsoil Removal

A. All areas to be occupied by proposed improvements, and borrow sites shall be stripped of all brush, weeds, grass, roots and other material.

B. Remove all loamy, organic topsoil suitable for seeding and planting to whatever depth encountered and store separately from other excavated material. Stockpile in designated areas and provide for proper drainage. Cover storage piles as required to prevent windblown dust.

C. In the event that inadequate space within the site or work area is available for stock-piling topsoil without interfering with other construction operations, contact OWNER for determination of another storage location.

D. Dispose of unsuitable topsoil as specified under disposal of debris. Excess topsoil shall be removed from site unless specifically noted on Contract Drawings.

3.08 Disposal of Debris

A. All combustible debris and refuse from site preparation operations shall be removed to legal off-site disposal areas.

B. All non-combustible debris (not including acceptable fill material, fences, or other structures), resulting from site preparation operations shall become the property of the CONTRACTOR and shall be removed to legal off-site disposal areas.

END OF SECTION

SECTION 02240

DEWATERING

PART 1 GENERAL

1.01 Section Includes

Dewatering design and operation requirements

1.02 Related Sections

Section 02370 - Erosion and Sedimentation Control

1.03 General Requirements

A. Obtain the services of a qualified dewatering specialist to provide dewatering plan as may be necessary to complete the Work. CONTRACTOR shall be solely responsible for the design, installation, operation, maintenance, and any failure of any component of the system. Dewatering shall meet all local and state regulations.

B. Design and provide dewatering system using accepted and professional methods consistent with current industry practice to eliminate water entering the excavation under hydrostatic head from the bottom and/or sides. Design system to prevent differential hydrostatic head which would result in floating out soil particles in a manner termed as a “quick” or “boiling” condition. System shall not be dependent solely upon sumps and/or pumping water from within the excavation where differential head would result in a quick condition, which would continue to worsen the integrity of the excavation’s stability.

C. Provide dewatering system of sufficient size and capacity to prevent ground and surface water flow into the excavation and to allow all Work to be installed in a dry condition.

D. No additional payment will be made for any supplemental measures to control seepage, groundwater, or artesian head.

E. Water samples at each dewatering location shall be collected and analytical tests from a certified laboratory for the parameters required in the FDEP Generic Permit for the Discharge of the Produced Ground Water from Any Non-Contaminated Site Activity 62-621.300 (2). The CONTRACTOR shall apply and obtain FDEP permit 61-621.300 (2).

F. CONTRACTOR shall be responsible for and shall repair without cost to the OWNER any damage to work in place, or other contractor’s equipment, utilities, residences, highways, roads, railroads, private and municipal well systems, adjacent

structures, natural resources, habitat, existing wells, and the excavation, including, damage to the bottom due to heave and including but not limited to, removal and pumping out of the excavated area that may result from CONTRACTOR's negligence, inadequate or improper design and operation of the dewatering system, and any mechanical or electrical failure of the dewatering system.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 General Requirements

A. Control, by acceptable means, all water regardless of source and be fully responsible for disposal of the water.

B. Confine discharge piping and/or ditches to available easement or to additional easement obtained by CONTRACTOR.

C. Control groundwater in a manner that preserves strength of foundation soils, does not cause instability or raveling of excavation slopes, and does not result in damage to existing structures. Where necessary to these purposes, lower water level in advance of excavation, utilizing wells, wellpoints, jet educators, or similar positive methods. Maintain the groundwater level to a minimum of 2 feet below excavations. Provide piezometers if directed by the ENGINEER to document the groundwater level is being maintained.

D. Commence dewatering prior to any appearance of water in excavation and continue until Work is complete to the extent that no damage results from hydrostatic pressure, flotation, or other causes.

E. Open pumping with sumps and ditches shall be allowed, provided the pumping does not result in boils, loss of fines, softening of the ground, or instability of slopes.

F. Install wells and/or wellpoints, if required, with suitable screens and filters, so that continuous pumping of fines does not occur. During normal pumping, and upon development of well(s), levels of fine sand or silt in the discharge water shall not exceed 5 ppm. Install sand tester on discharge of each pump during testing to verify that levels are not exceeded.

G. Control grading around excavations to prevent surface water from flowing into excavation areas.

H. Remove subgrade materials rendered unsuitable by excessive wetting and replace with approved backfill material at no additional cost to the OWNER.

I. Walls shall not be exposed to water pressure before structural work at the next higher level has properly cured and the cantilever action of walls is eliminated.

J. Any dewatering pumps within 1500-ft of private residences shall be equipped with satisfactory sound suppression.

K. Water from dewatering activities shall be disposed in a manner that does not cause flooding, erosion, or the transfer of sediments.

3.02 Maintaining Excavation in Dewatering Condition

A. Dewatering shall be a continuous operation. Interruptions due to power outages, or any other reason, will not be permitted.

B. Continuously maintain excavation in a dry condition with positive dewatering methods during preparation of subgrade, installation of pipe, and construction of structures until the critical period of construction and/or backfill is completed to prevent damage of subgrade support, piping, structure, side slopes, or adjacent facilities from flotation or other hydrostatic pressure imbalance.

C. Provide standby equipment on site, installed, wired, and available for immediate operation if required to maintain dewatering on a continuous basis in the event any part of the system becomes inadequate or fails. If dewatering requirements are not satisfied due to inadequacy or failure of dewatering system, perform such work as may be required to restore damaged structures and foundation soils at no additional cost to OWNER.

D. System maintenance shall include but not be limited to 24-hour supervision by personnel skilled in the operation, maintenance, and replacement of system components, and any other work required to maintain excavation in dewatered condition.

3.03 System Removal

Remove all dewatering equipment from the site, including wells and related temporary electrical service. Restore any impacted areas to like new conditions.

END OF SECTION

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SECTION 02310

FINISH GRADING

PART 1 GENERAL

1.01 Section Includes

Topsoil placement, grading of site

1.02 Related Sections

Section 02230 - Site Preparation

PART 2 PRODUCTS

2.01 Topsoil

A. Topsoil shall be fertile, friable, natural topsoil typical of the area, free from subsoil, stones, plants, roots or other extraneous material and shall not be used while muddy or frozen.

B. Topsoil shall contain not less than 8% organic matter (AASHTO T194). The topsoil shall consist of either natural topsoils typical of the locality and free from coarse stone aggregate or surface soils stripped from the site and enriched with humus at a rate of 8% by volume. The soil mixture prepared by mixing surface soils and humus shall be free of oil, cinders, coarse stone, and woody root material.

PART 3 EXECUTION

3.01 General

Provide all topsoil placement, grading and filling to achieve the lines and grades indicated on the Drawings. All earthwork shall be done in a manner that provides drainage.

3.02 Topsoil Placement

Place topsoil in all areas of new grading. The compacted subgrade to receive topsoil shall be scarified to a depth of 3 inches. Topsoil shall be spread evenly and compacted to a thickness of not less than 4 inches, 8 inches in areas to be grassed and planted, and to the proposed elevations and grades. Grade topsoil flush with walks, curbs, and paving.

3.03 Finish Grading

A. All areas of the project including all previously grassed areas that have been disturbed, borrow sites, excavated and filled sections and adjacent transition areas shall be uniformly smooth-graded. Depressions from settlement shall be filled and compacted. Tops of embankments and breaks in grade shall be rounded. All surfaces shall be finished to provide adequate drainage. Finished surfaces shall be reasonably smooth, compacted, free from irregular surface changes and comparable to the smoothness obtained by blade-grader operations.

B. Slope grades to drain away from structures at a minimum of 3-inch per foot for 10 feet.

C. Finished surfaces adjacent to paved or surfaced areas and within 10 feet of structures shall be within 1 inch of the proposed grade. All other areas shall be within 3 inches of the proposed grade.

D. Newly graded areas shall be protected from traffic and erosion. All settlement or washing away that may occur from any cause prior to seeding or acceptance shall be repaired and grades re-established to the required elevations and slopes at no additional cost to the OWNER.

E. Unless otherwise indicated, all surplus material shall be disposed of by the CONTRACTOR.

END OF SECTION

SECTION 02320

TRENCHING, BEDDING, AND BACKFILLING

PART 1 GENERAL

1.01 Section Includes

A. Trenching for piping.

B. Sheeting, shoring and bracing

C. Bedding, backfilling, and compaction.

1.02 Related Sections

A. Section 02230 - Site Preparation

B. Section 02240 – Dewatering

C. Section 02310 - Finish Grading

D. Section 02370 - Erosion and Sedimentation Control

1.03 References

A. American Association of State Highway and Transportation Officials (AASHTO) latest edition:

1. AASHTO M145 - Classification of Soils and Soil Aggregate Mixtures
2. AASHTO T180 - Moisture-Density Relations of Soils Using a 10-lb Rammer and 18-in Drop

B. American Society for Testing and Materials (ASTM) latest edition:

1. ASTM D1557 - Laboratory Compaction Characteristics of Soil Using Modified Effort
2. ASTM D2487 - Classification of Soils for Engineering Purposes

C. Occupational Safety and Health Administration (OSHA) Regulations, including:

Part 1926 Subpart P – Excavations

1.04 Definitions

A. Bedding - Area from bottom of trench to centerline of pipe

B. Backfill - Material above the top of pipe to the topsoil, paving sub-grade, or foundation level.

C. Influence Area - The area within lines sloped downward at 45^{o} from the outer edges of paving, foundations, and utility lines. As a minimum, the influence area shall extend 5 feet beyond the edge of pavement (where there is no curb) or 5 feet beyond the back of curb.

1.05 Quality Assurance

Field density testing frequencies:

A. Two tests for each 300 linear feet of pipeline or fraction thereof per lift of general backfilling in the pipeline trench.

B. One test per lift per each change in type of fill.

1.06 Preconstruction Requirements

Precondition surveys and vibration monitoring are required for those areas where residential structures are within 100 feet of the proposed construction.

PART 2 PRODUCTS

2.01 General

Previously excavated materials conforming to the following requirements shall be used wherever possible.

2.02 Materials

A. Acceptable materials (suitable material): AASHTO M145 classification A-1, A-3, A-2-4, A-2-6; ASTM D2487 classification GW, GP, GM, SM, SW, SP; unless otherwise disapproved within the Soil and Subsurface investigation reports. No more than 12 percent of acceptable materials shall pass the number 200 sieve.

B. Unacceptable materials (unsuitable material): AASHTO M145 classification A-2-5, A-2-7, A-4, A-5, A-6, A-7, A-8; ASTM D2487 classification GC, SC, ML, MH, CL, CH, OL, OH, PT; unless otherwise approved within the Soil and Subsurface investigation reports.

C. Controlled low strength material (“excavatable flowable fill”) shall meet the requirements of FDOT specification section 121, with a 28-day compressive strength of 80-100 psi.

2.03 Sheeting, Shoring, and Bracing

A. Structural strength and safety of all sheeting, shoring and bracing shall be the sole responsibility of the CONTRACTOR. Repair any damage resulting from failure to provide adequate supports.

B. Provide timber-work, shoring, bracing, sheeting, and sheet piling where necessary to retain banks of excavations, prevent cave-in of adjacent ground, prevent displacement of utilities and structures, and to protect public safety.

C. CONTRACTOR is solely responsible for the design, installation, and operation of dewatering systems and their safety and conformity with local codes and regulations.

PART 3 EXECUTION

3.01 General Construction Requirements

A. Provide suitable temporary drainage channels for any water that may flow along or across the work as specified hereafter.

B. Provide barriers, warning lights and other protective devices at all excavations.

C. Sidewalks, roads, streets, and pavements shall not be blocked or obstructed by excavated materials, except as authorized by the ENGINEER, in which case adequate temporary provisions must be made for satisfactory temporary passage of pedestrians, and vehicles. Minimize inconvenience to public travel or to tenants occupying adjoining property.

D. Where necessary to place excavated material adjacent to buildings, erect barriers to keep earth at least 4' from such buildings. Earth deposited on lawns shall be promptly and carefully removed to preserve the turf. All trees, shrubs, and landscaping shall be protected. Boring and jacking shall be used, if necessary, except where written permission is granted to remove trees and shrubs.

E. If open excavations cross existing rigid surfacing, the surfacing shall be removed for a width one foot beyond the anticipated edge of the excavation. The pavement break shall be sawed to insure a straight joint. Surface replacement shall match existing surfacing except as otherwise indicated on the Drawings. Where open excavation is allowed along or across public roadways, excavation, backfill, and surface replacement shall conform to the requirements of all permits applicable thereto. In no case shall surface replacement edges bear on less than 12 inches of undisturbed soil.

3.02 Preparation

A. Identify required lines, levels, contours, and datum.

B. Locate and identify existing utilities that are to remain and protect from damage.

C. Notify utility companies to remove or relocate utilities that are in conflict with proposed improvements.

D. Protect plant life, lawns, fences, existing structures, sidewalks, paving, and curbs from excavating equipment and vehicular traffic.

E. Protect benchmarks, property corners, and other survey monuments from damage or displacement. If marker needs to be removed the marker shall be referenced by licensed land surveyor and replaced, as necessary, by same.

3.03 Sheeting, Shoring, and Bracing

A. Furnish, install, and maintain, without additional compensation, sheeting, bracing, and shoring support required to keep excavations within the easement provided, to support the sides of the excavation, and to prevent any movement which may damage adjacent pavements or structures, damage or delay the work, or endanger life and health. Voids outside the supports shall be immediately filled and compacted.

B. Sheeting, where required, shall be driven below the bottom of excavation so the lowest set of wales and struts are above the bottom of the excavation to allow necessary working room.

C. ENGINEER may direct in writing that supports in trenches be cut off at any specified elevation, in which case CONTRACTOR shall be paid for the supports left in place.

D. CONTRACTOR may leave in place, to be embedded in the backfill of the excavation, any or all supports for the purpose of preventing injury to persons or property, whether public or private. However, no supports which are within 4 feet of the ground or pavement surface may be left in place without written permission of the ENGINEER. No extra payment will be made for supports left in place at the CONTRACTOR's option.

E. All supports not left in place shall be removed in such manner as to avoid endangering the piping, structures, utilities or property, whether public or private. All voids left by the withdrawal of sheeting shall be immediately filled and compacted.

F. ENGINEER has the right to order supports left in place and shall not be construed as creating an obligation on his part to issue such orders. Failure by the ENGINEER to exercise this right shall not relieve the CONTRACTOR from total liability for

damages to persons or property resulting from the failure of the CONTRACTOR to leave in place sufficient supports to prevent any caving or moving of the ground adjacent to the excavation.

3.04 Trenching

A. All excavations shall be made by open cut unless otherwise indicated. Sides of trenches shall be kept as nearly vertical as possible from the trench bottom to a level of one foot above the top of the pipe. Slope sides of trenches in accordance with OSHA requirements and the recommendations contained within the project geotechnical report.

B. Excavation of trenches shall not advance more than 50 feet ahead of completed pipe installation except as approved by the ENGINEER.

C. Excavate trenches to depth indicated or required for indicated flow lines and invert elevations. Over excavate trenches a minimum of 2 feet where excavations occur within unsuitable soils, and replace over excavated material with suitable soils.

D. Where rock is encountered, carry excavation 6 inches below scheduled elevation and backfill with a 6 inch layer of crushed stone or gravel prior to installation of pipe.

E. For pipes or conduit 5 inches or less, excavate to indicated depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.

F. For pipes or conduit 6 inches or larger, and other work indicated to receive subbase, excavate to subbase depth indicated, or, if not otherwise indicated, to 6 inches below bottom of work to be supported.

G. Except as otherwise indicated, excavate for pressure piping so top of piping is minimum 3 feet below finished grade.

H. Unsuitable excavated materials shall be removed from the site and disposed, unless otherwise indicated on the Drawings.

I. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

J. Trench bottoms shall be kept dry, compacted, and stable to a depth two feet below the bottom of the trench.

K. Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide 9 -12 inch clearance on each side of pipe or conduit.

L. If more than one pipe is to be installed in a trench, the pipes shall be spaced a minimum of one foot apart for pipes 4 inches and larger.

M. If portions of the bottom of trenches consist of material unstable to such a degree that, in the opinion of the ENGINEER, the material cannot adequately support the pipe or structure, the bottom shall be over excavated and stabilized with approved coarse granular stabilization material. Depth of stabilization shall be as directed by the ENGINEER. The initial 50 tons of stabilization shall be incidental to the Contract. Compensation will be allowed only for such additional quantities as the ENGINEER shall direct in writing to be placed.

N. Do not backfill trenches until tests and inspections have been made.

3.05 Trench Backfilling

A. Following placement of pipe and inspection of joints, install tamped bedding material. Place bedding fill materials in layers of 6 inch loose depth.

B. All bedding and backfill material shall be suitable soils or flowable fill. Backfill material within 1 foot of pipe and appurtenances shall not contain rock or stone larger than 2 inch diameter. If a sufficient quantity of suitable material is not available from the trench or other excavations within the site, provide additional suitable material or flowable fill.

C. After completion of bedding and preliminary approval of piping and testing, the pipe shall be covered to a point one foot above the top of the pipe for the full trench width, placed in layers of 8 inch loose depth.

D. Place backfill over pipe. Where trench is within the influence area of roadways, structures, foundations, or slabs, place backfill in layers of 8 inch loose depth. In all other areas, place backfill in layers of 12 inch loose depth.

E. Take necessary precautions not to cause settlement or damage to adjacent slabs, walls, structures, or foundations. Place backfill and fill materials evenly adjacent to structures, without wedging against structures or displacement of piping or conduit.

3.06 Compaction

A. Unless otherwise indicated, the type of equipment and number of passes required to obtain the specified degree of compaction shall be determined at the site, subject to the approval of the ENGINEER.

B. Provide mechanical compaction for cohesive material and vibratory compaction for granular materials, unless otherwise approved by the ENGINEER. Vibratory compaction is not allowed within 100 feet of existing structures. In these areas, compaction shall be accomplished by static means only. If compaction difficulties

arise, the ENGINEER shall be consulted to review and possibly modify compaction procedures.

C. Noncohesive soils shall be compacted with vibrating roller or equivalent; cohesive soils shall be compacted with sheeps-foot roller, pneumatic tamping, or approved equivalent, unless otherwise indicated.

D. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

3.07 Testing and Cleanup

A. Provide for testing and cleanup as soon as practicable, so these operations do not lag far behind pipe installation. Perform preliminary cleanup and grading operations immediately after backfilling.

B. All surplus excavated material shall be disposed of by the CONTRACTOR.

3.08 Field Quality Control

Minimum Density Requirement (ASTM D1557 or AASHTO T180 Modified)

A. Fill under and within the influence area of roadways, structures, slabs, foundations = 98 percent
B. Pond and road embankment fill = 95 percent
C Landscape areas = 85 percent
D. All other areas = 90 percent

END OF SECTION

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SECTION 02370

EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 Section Includes

Designing, providing, maintaining, and removing temporary erosion and sedimentation controls.

1.02 Related Sections

A. Section 02230 – Site Preparation

B. Section 02240 - Dewatering

C. Section 02320 – Trenching, Bedding, and Backfilling

1.03 References

Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction and Roadway and Traffic Design Standards, latest editions:

A. Index No. 102 - Baled Hay or Straw Barriers and Silt Fences

B. Index No. 103 - Turbidity Barriers

C. Specification 300 - Prime and Tack Coats for Base Courses

1.04 Submittals

Provide erosion control plan. Show types of erosion and sedimentation control, locations, inspection and maintenance plan.

1.05 OWNER'S Instructions / Sequencing

A. OWNER has authority to limit surface area of erodible earth material exposed by clearing and grubbing, excavation, trenching, borrow and embankment operations. OWNER also has authority to direct CONTRACTOR to provide immediate permanent or temporary erosion and sediment control measures.

B. CONTRACTOR shall respond to erosion and sediment control maintenance requirements or implement additional measures to control erosion ordered by

OWNER or governing authorities within 48 hours or sooner if required at no additional cost to the OWNER.

C. CONTRACTOR will be required to incorporate permanent erosion control features into project at earliest practical time to minimize need for temporary controls.

PART 2 PRODUCTS

2.01 Erosion Control

A. Seeding and Mulching

B. Sodding

C. Hydro-seeding

D. Coarse Aggregate

E. Prime Coat - Per FDOT Specification 300

F. Construction Road Stabilization

2.02 Sedimentation Control

A. Silt Fence - Per FDOT Index No. 102

B. Floating Turbidity Barriers - Per FDOT Index No. 103

C. Hay Bales - Per FDOT Index No. 102

PART 3 EXECUTION

3.01 Erosion Control

A. Establish erosion control measures within 48 hours of the completion of any clearing and grading activities.

B. Erosion control of areas to be paved shall meet the following:

1. Install subgrade and base course materials within 48 hours of the completion of grading activities.

2. Areas to receive asphalt shall receive erosion control measures no later than 48 hours after acceptance of base course. Temporary erosion control consists

of placement of a bituminous prime coat and sanding the surface. Permanent erosion control consists of placement of the structural course.

3. Areas to receive concrete paving shall be either protected with a layer of FDOT coarse aggregate material or shall be paved within 48 hours of acceptance of the subgrade.

3.02 Sedimentation Control

A. Install prior to construction.

B. Inspect every two weeks during construction.

C. Remove any sediment build-up.

D. Repair and reinstall any damaged or missing sediment control measures. Install additional measures if inspection reveals additional sedimentation control is necessary.

E. Rough excavate and grade any proposed stormwater ponds at the start of site grading activities. Direct site runoff to the ponds to minimize runoff to offsite areas.

END OF SECTION

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SECTION 02505

PIPELINE REMOVAL AND ABANDONMENT

PART 1 GENERAL

1.01 Section Includes

Pipeline removal, abandonment, including pipeline grouting

1.02 Related Sections

Section 02230 - Site Preparation

1.03 References

A. American Water Works Association (AWWA) and American National Standards Institute (ANSI) latest edition:

1. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings
2. ANSI/AWWA C153/A21.53 - Compact Ductile Iron Fittings

B. All work associated with asbestos material shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.

1. Florida Administrative Code, Chapter 17-251, "Asbestos"
2. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR 61, subpart M.
3. Occupational Safety and Health Act, 29 CFR
4. Environmental Protection Agency (EPA) Asbestos Abatement Worker Protection Rule
5. Florida Statute 455.300
6. Asbestos Pipe Handling Best Management Practices provided at the end of this section.

1.04 Definitions

A. Pipeline Abandonment - isolate from active pipelines, remove from service, dispose of pipeline contents, plug pipeline, leave pipe in place.

B. Pipeline Removal - isolate from active pipelines, remove from service, dispose of pipeline contents, remove pipe, valves, fittings, dispose or stockpile removed materials as required.

C. Take Out of Service - see "pipeline abandonment".

1.05 Submittals

A. Grout mixture data

B. Asbestos abatement contractor/subcontractor licensing and qualifications

C. Pipeline grouting contractor/subcontractor licensing and qualifications

1.06 Qualifications

All work associated with the removal or taking out of service of existing asbestos cement pipelines shall be performed by a licensed asbestos abatement contractor or subcontractor registered in the State of Florida.

1.07 Quality Control

A. CONTRACTOR is responsible for providing supervision and inspections to ensure that the existing piping is removed and disposed, salvaged or retired as designated in the Drawings and as specified herein.

B. Asbestos Pipe

1. All removal or retirement of pipe material containing asbestos shall be performed by a licensed asbestos abatement contractor or subcontractor.

2. Asbestos abatement contactor or subcontractor shall contact the Orange County Environmental Protection Division prior to removal or retirement of any asbestos material and shall obtain all required permits and licenses and issue all required notices as required by the Orange County Environmental Protection Division. The CONTRACTOR shall be responsible for all fees associated with permits, licenses and notices to the governing regulatory agencies.

3. Asbestos abatement contractor or subcontractor shall contact the Department of Environmental Protection (DEP) in Tallahassee and Orange County, prior to removal or retirement of any asbestos material and shall obtain all required permits and licenses and issue all required notices as required by DEP. The CONTRACTOR shall be responsible for all fees associated with permits, licenses and notices to the governing regulatory agencies.

4. Asbestos abatement contractor shall perform all work in accordance with all applicable standards in paragraph 1.03 B of this section.

PART 2 PRODUCTS

2.01 Fittings

A. Fittings shall be manufactured of ductile iron, conforming to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.

B. All fittings shall be Class 250.

C. All fittings shall be as listed in of the "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

2.02 Concrete Grout

Provide grout with minimum 28 day compressive strength of 1000 psi, minimum slump of 5 inches, and maximum slump of 9 inches. The grout mixture per cubic yard shall be:

A. Cement - 500 pounds

B. Fly Ash - 500 pounds

C. Water - 350 pounds (42 gallons)

D. Sand - 2248 pounds

E. Air entrainment admixture (Darex or equal) - 3 ounces

F. Bentonite - 6 pounds (to be mixed with sufficient water to form colloidal mixture, added at the job site)

PART 3 EXECUTION

3.01 Preparation

Implement traffic control measures prior to construction.

3.02 Pipe Isolation

A. Where indicated on the Drawings, line stops shall be utilized to isolate portions of pressurized mains.

B. In lieu of line stops, the use of existing valves may be used to isolate portions of the pipeline. Provide a written proposal showing existing valves to be closed to provide isolation. Review of proposal will be conducted by ENGINEER and Utility to determine affected area. In no case will service to residences and businesses affected by the isolation be allowed to be interrupted by more than 1 hour.

C. Line stops shall be completed while the pipelines are pressurized.

D. Line stops shall consist of a line stop fitting, stopping valve, blind flange for installation after stop is completed, 1 inch equalization/purge fitting, and concrete supports under line stop assembly.

E. Provide additional pipe restraining in the vicinity of the line stop for preventing pipe movement due to any unbalanced forces created by the line stop and subsequent cutting and removal of existing pipe adjacent to any line stop.

F. In the event a pressurized potable water pipeline that will remain in service loses pressure to less than 20 psi, disinfect the water main and submit bacteriological test results to the Florida Department of Environmental Protection. Satisfactory test results are required to be submitted for tests conducted on two consecutive days.

3.03 Retirement, Removal, Salvage, and Disposal

A. CONTRACTOR shall uncover and remove existing pipe as shown on the Drawings. No pipe shall be removed until the new pipe is installed and placed in operation.

B. Removal: Existing pipe and structures designated to be removed on the Drawings shall be completely drained and the contents properly disposed. The existing pipe shall then be completely removed by the CONTRACTOR and disposed from the site. The existing structures, connected to piping designated to be retired and connected to piping designated to be removed, shall then either be completely removed by the CONTRACTOR and disposed from the site or completely removed and salvaged by the CONTRACTOR for the OWNER's use as follows:

1. Piping and structures to be removed and disposed:

    a. Existing pipe designated to be removed and disposed of as shown on the Drawings.

    b. Asbestos: Pipe material containing asbestos shall be removed and disposed by a licensed asbestos abatement contractor or subcontractor in accordance with the standards referenced in paragraph 1.03 B of this section.

C. Exposing and removing existing asbestos-cement pipe shall be performed in strict accordance with all applicable rules, regulations, laws and standards. The CONTRACTOR shall be responsible for ensuring that all rules, regulations, laws, and standards are met and for monitoring quality control.

D. All asbestos-cement pipe shall be properly disposed in accordance with all rules, regulations, laws, and standards.

E. At locations where pipe is removed, install ductile iron plug fitting on remaining pipe. Pour concrete thrust restraint block or implement other restraining measures to prevent pipe movement.

3.04 Pipe Cutting and Plugging

A. Cut all pipe as necessary. Cut sections of pipe shall be reamed or filed to remove all burrs. The contents of the pipe are to be removed and disposed as allowed by local rules and regulations.

B. Plug ends of pipe to remain in accordance with the following:

1. Remaining pressurized pipe - install ductile iron plug fitting. Pour concrete thrust restraint block or implement other restraining measures to prevent pipe movement.

2. Remaining non-pressurized pipe - grout ends of pipe or install ductile iron cap fitting.

3.05 Pipeline Abandonment Schedule (Schedule of Pipe Taken Out of Service)

Remove or abandon (take out of service) in accordance with information shown on the Drawings. Abandonment (taking out of service) shall be in accordance with the following schedule:

Pipes Under Roadways or Less than 5-ft from Edge of Pavement	
2 Inch and Larger Pipe	Fully grout along entire length. Cap both ends
Pipes Outside Roadways (5-Ft or More from Edge of Pavement)	
Ductile Iron Pipe (All Sizes)	Cap or grout the ends of the pipe
2 Inch and Larger Size (Other Than Ductile Iron)	Fully grout pipe along entire length. Cap both ends.

3.06 Pipeline Grouting

A. Grouting program shall consist of pumping sand cement grout at pressures necessary to fill pipe sections.

B. Introduce grout to lowest end of pipeline in order to displace air and entrapped material within the pipeline.

C. Grouting of pipe shall be completed in sections not exceeding 400 feet in length and shall not be completed in more than 3 stages, with the final stage containing at least 50 percent of the volume to be grouted for the section.

D. One set of three 3 inch x 6 inch sample test cylinders shall be made for each grout mix preparation.

E. Pump used for grouting shall be a continuous flow positive displacement model with a pugmill type mixing vat having a minimum shaft speed of 60 rpm and incorporated as an integral part of the equipment. Alternate equipment may be used subject to the approval of the ENGINEER. The rate of pumping shall not exceed 6 cubic feet per minute.

F. Grout shall not be allowed to set up until the line being filled is full and there is still free flowing grout from the far end of each section.

3.07 Restoration

Restore all areas disturbed as a result of pipeline removal and abandonment to equal or better condition than the existing condition.

3.08 Monitoring

A. Resident Project Representative may stop the grouting operations at any time, if in his judgment, the operation does not comply with these Specifications or if the work is not to his satisfaction.

B. Resident Project Representative shall make all measurements of pipe length grouted grout quantity pumped, and maintain records of each day's operations for the benefit of the OWNER and the CONTRACTOR. The quantities recorded by the OWNERs representative shall be considered final.

ASBESTOS PIPE HANDLING BEST MANAGEMENT PRACTICES

1. County projects will require worker documentation before entering the regulated work area. A copy of: their current training certificate (workers and their supervisor); current medical condition showing the doctor approved their working with asbestos and wearing a respirator; signed acknowledgment forms; and current record (6 months) of each workers respirator fit test will be required from all workers.

2. County projects also require air monitoring. OSHA will accept historic data on air monitoring within 12 months of the project, provided the data is from a project of like material and conditions with a crew of the same experience, supervision, and training. Otherwise, monitoring is required throughout the project. OSHA requires two types of personnel air monitoring, full shift and 30-minute excursion level (when highest levels are anticipated).

3. Some provisions should be made for worker showering or otherwise washing following work before removing respirators, etc. Even if direct exposure is not anticipated, and at a

minimum, a source of water to rinse the respirators, wash workers faces and hands, and (in the event of unanticipated direct exposure) some place to shower is required. The workers will also need a change room and some place to keep their street clothes and personal possessions.

4. Proposals to remove asbestos pipe sections by cutting must address how the cutting debris will be captured and kept from becoming airborne. Soil that could be considered contaminated may also have to be removed.

5. Licensed asbestos abatement contractors or subcontractors should have a pollution endorsement in their liability insurance in case of asbestos fiber release. A contingency plan, in case the project does not run as smoothly as expected, should be developed and include emergency phone numbers kept on site during the project.

6. Daily logs of the asbestos removal work should be kept, and should include sign in sheets for the workers and whatever air monitoring was done. Accident reports and other reports or correspondence if something unusual happened should also be included.

7. Waste receipts must be kept through all stages of transport from the site to, and including, the acceptance at the dump site where the material will be abandoned. Amount of material removed must be equal to the amount of material to be turned in to the dump.

8. Primary Contractor will give "approval for tear down" at project final completion, indicating that all asbestos removal operations are complete and where there is a need for any air monitoring. Air monitoring, if not required by any governing agency or approved permit as discussed previously, may also be required by the OWNER if documentation to the public relative to contamination is deemed necessary. Air monitoring is normally done by collecting area samples downwind of the project at the barrier tape or just inside the project. Monitoring requires a source of electricity to run the pumps, which is often provided by a generator.

END OF SECTION

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SECTION 02530

SANITARY SEWER GRAVITY MAIN SYSTEMS

PART 1 GENERAL

1.01 Section Includes

A. Piping (non-pressurized sewer systems)

B. Leakage and Deflection Testing

1.02 Related Sections

A. Section 02320 - Trenching, Bedding and Backfilling

B. Section 02605 - Precast Structures and Appurtenances

1.03 References

A. American Society for Testing and Materials (ASTM) latest edition:

1. ASTM D3034 - Type PSM Polyvinyl Chloride Sewer Pipe and Fittings
2. ASTM D3212 - Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
3. ASTM F477 - Elastomeric Seals (Gaskets) for Joining Plastic Pipe
4. ASTM F679 - Polyvinyl Chloride Large Diameter Plastic Gravity Sewer Pipe and Fittings
5. ASTM F1417 - Installation Acceptance of Plastic Gravity Sewer Lines Using Low-Pressure Air

B. American Water Works Association (AWWA) and American National Standards Institute (ANSI) latest edition:

1. AWWA C600 - Installation of Ductile Iron Water Mains and Their Appurtenances
2. AWWA C605 - Underground Installation of PVC Pipe and Fittings for Water
3. AWWA C900 - PVC Pressure Pipe, and Fabricated Fittings, 4 Inch Through 12 Inch, for Water Distribution
4. AWWA C905 - PVC Pressure Pipe and Fabricated Fittings, 14 Inch Through 48 Inch

1.04 Submittals

A. Details of joints for all piping 6 inches and larger

B. Product data for gaskets for all piping

C. Product data for all pipe 6 inches in diameter and larger

D. Piping specialties and installation details.

1.05 Product Delivery, Storage, and Handling

Exercise care in transporting and handling pipe in order to avoid damage to materials or coatings. Lifting shall be by hoist or on skids when hand lifting is not feasible. Dropping shall not be permitted. Store pipe as recommended by the manufacturer. Damaged pipe shall be replaced.

PART 2 PRODUCTS

2.01 PVC (Polyvinyl Chloride) Sewer Pipe, Joints, and Fittings

A. PVC sewer pipe shall be Type PSM PVC pipe conforming to ASTM D3034 and shall be SDR 35 for 4 inch through 15 inch diameter, and ASTM F 679, wall thickness T-1, for pipe 18 inch through 27 inch diameter.

B. Joints shall meet the requirements of ASTM D3212 using rubber gaskets conforming to ASTM F477.

C. Fittings shall conform to the same requirements as the pipe. Provide adapters as required to join PVC pipe to pipe, fittings and equipment of other materials.

D. Solvent cement shall be as recommended by the pipe manufacturer

E. PVC pipe shall be color-coded green, stenciled "Sewer Pipe" (0.75-inch lettering on the pipe in at least three areas per pipe section).

2.02 Pipeline Identification Tape

A. Identification tape shall be an inert plastic film specifically formulated for prolonged underground use. Minimum thickness 4 mils, width 6 inches, letter size 1 inch. Lettering shall be continuous.

B. Tape shall be the standard product of a manufacturer regularly engaged in the supply of this tape. Provide tape with adhesive backing for attachment to pipe.

C. Identification tape shall be color coded green with black lettering "SEWER PIPE".

2.03 Pipeline Warning Tape

Warning tape shall be 6 inch wide vinyl continuous tape, for identification and warning purposes. It

shall be color coded GREEN with black lettering “CAUTION: SEWER BURIED BELOW”.

PART 3 EXECUTION

3.01 General Installation Requirements

A. All lengths of pipe shall be dimensioned accurately to measurements established at the site, and shall be worked into place without springing or forcing.

B. Cut all pipe as necessary. Cut sections of pipe shall be reamed or filed to remove all burrs. The pipe interior and joints shall be thoroughly cleaned before being installed and kept clean during construction.

C. Trenching, bedding and backfilling shall be in accordance with Section 02320.

D. Establish survey control. Line and grade of pipe shall be checked continuously on a joint by joint basis.

E. Pipe shall be laid progressively up grade, with bell upstream, in a manner to form close, concentric joints with smooth bottom inverts.

F. Installed piping systems shall be temporarily plugged at the end of each day's work, or other interruption to progress on a given line. Plugging shall be adequate to prevent entry of small animals or persons into the pipe or the entrance or insertion of deleterious materials.

G. Connections to existing sewer shall be conducted in such a manner that the existing sewer remains in operation. Provide by pass pumping of existing flows or collect and legally dispose of existing sewer flow as needed to accommodate construction while keeping existing sewer in service.

H. Minimum cover over the pipe shall be 36 inches.

3.02 O-Ring Type Push-On Joints for PVC Pipe

A. Before making joint, clean the pipe end and the bell thoroughly. Insert the O-Ring gasket, making certain it is properly oriented. Lubricate the spigot well with an approved lubricant; do not lubricate the bell or O-ring. Insert the spigot end of the pipe carefully into the bell until the reference mark on the spigot is flush with the bell.

B. Field cut pipe shall be beveled, have all burrs removed, and shall have a reference mark applied the correct distance from the end.

C. On field cut pipe, provide homing mark in accordance with manufacturer’s recommendations.

D. All pipe laid shall be retained in position to maintain alignment and joint closure until backfill has been placed.

3.03 Separation of Sanitary Sewer Lines and Potable Water Mains

A. The outside of gravity type sanitary sewer lines shall be separated horizontally a minimum of six feet from the outside of any existing or proposed water main. The minimum horizontal separation distance between the outside of gravity sanitary sewer and the outside of water mains can be reduced to three feet where the bottom of the water main is at least six inches above the top of the sewer.

B. Wherever possible, gravity sanitary sewer shall cross under existing or proposed water mains, so the outside of the sewer is at least six inches below the outside of the water main. Where it is not possible for the sewer to cross under existing or proposed water mains, then the sewer can cross over the water main provided the outside of the sewer is at least 12 inches above the outside of the water main. At the crossing, the proposed pipe joints shall be arranged so that all water main joints are at least six feet from gravity sanitary sewer joints.

C. No water main shall pass through or come in contact with any part of a sanitary sewer manhole.

D. The following are acceptable alternative construction features to be considered for cost evaluation with no guarantee they will be approved for implementation where it is not possible to meet the separation requirements. Exceptions from meeting the pipe separation requirements, without mitigation, shall be allowed only by FDEP if technical or economic justifications for each exception provided by the Engineer are acceptable to FDEP and are only to be implemented upon receipt of expressed written consent from the Engineer and approval from FDEP on a case by case basis. All possible measures to achieve compliance with the pipe separation requirements shall be considered first along with design changes to meet the requirements before the Engineer submits a justification of an exception to FDEP for approval. Implementation of these measures without the expressed written consent of the Engineer and approval by FDEP could result in the requirement that the installed unapproved measures be removed and replaced at no cost.

1. Where sewer is less than the required minimum horizontal distance from a water main and or where the sewer crosses a water main and joints in the sewer are less than the minimum required distance between the joints in the water main:

    a. Use of pressure rated pipe conforming to AWWA standards for a gravity or vacuum type pipeline.
    b. Use of welded, fused, or otherwise restrained joints for either pipeline.

c. Use of watertight casing pipe or concrete encasement at least four inches thick for either pipe.

2. Where sewer is less than three feet horizontally from a water main and or where a sewer crosses a water main at less than the required minimum separation:

a. Use of pipe or casing pipe, having high impact strength (at least equal to 0.25 inch thick ductile iron pipe), or concrete encasement at least four inches thick for both the sewer and the water main.

3.04 Installation of Identification and Warning Tape

A. Install identification tape on all pipelines. Place tape as follows:

1. 2 inch through 8 inch diameter pipe - center along top half of pipe
2. 10 inch through 18 inch diameter pipe - place along both sides of the top half of pipe
3. 20 inch diameter and larger pipe - place on both sides of top half of pipe with a third strip centered along top half of pipe

B. Place tape from joint to joint on every section of pipe.

C. Install warning tape along all pipelines. Install 2 feet above pipe, minimum of 1 foot below grade.

3.05 Testing General Requirements

A. Test procedures shall be approved by the Engineer. All tests shall be made in the presence of the Engineer and utility. Preliminary tests made by the Contractor without being observed by the Engineer will not be accepted. Notify the Engineer and the utility companies at least 48 hours before any work is to be inspected or tested.

B. All defects in piping systems shall be repaired and/or replaced and retested until acceptable. Repairs shall be made to the standard of quality specified for the entire system.

C. Sections of the system may be tested separately, but any defect which may develop in a section previously tested and accepted shall be promptly corrected and retested.

D. Provide all equipment for testing. Increments on gages used for low pressure air testing shall be of scaled to the nearest 0.1 psi. Gages, pumps, and hoses shall be in good working order with no noticeable leaks.

E. Tests for any exposed piping shall be made before covering and insulation is placed.

F. Lines tested before backfill is in place shall be retested after compacted backfill is placed.

G. All service laterals shall be completed prior to testing, and are subject to the same testing requirements as the main line.

H. Sections of piping may be isolated for testing. If shorter sections are tested, test plugs or bulkheads required at the ends of the test section shall be furnished and installed by Contractor, together with all anchors, braces, and other devices required to withstand the pressure without imposing any thrust on the pipe line. Contractor shall be solely responsible for any damage which may result from the failure of test plugs or supports.

3.06 Visual Inspections and Leakage Testing

A. Prior to inspections and testing, clean all installed lines and manholes.

B. After backfill has been placed, the Engineer will visually inspect all gravity flow lines to check alignment and grade. All obstructions shall be removed.

C. Provide light source and mirrors for lamping of sewer. Any sewer in which the direct light of a lamp cannot be viewed in either direction, full circle, between adjacent manholes shall be considered unsatisfactory, unless the line is designed with horizontal deflections, and shall be repaired by the Contractor without additional compensation.

D. Conduct low pressure air testing (4.0 psi initial pressure) of installed sewer piping in accordance with ASTM F1417. Maximum allowable leakage is 0.0015 cubic feet per minute per square foot internal surface area being tested. Allowable air pressure drop during the test is 0.5 psig. Minimum required test time (duration) is:

Pipe Diameter (In)	**Minimum Required Test Duration**
4	1 min 53 sec
6	2 min 50 sec, or 0.427 x length of pipe tested, whichever is greater
8	3 min 47 sec, or 0.760 x length of pipe tested, whichever is greater
10	4 min 43 sec, or 1.187 x length of pipe tested, whichever is greater
12	5 min 40 sec, or 1.709 x length of pipe tested, whichever is greater
15	7 min 05 sec, or 2.671 x length of pipe tested, whichever is greater
18	8 min 30 sec, or 3.846 x length of pipe tested, whichever is greater
24	11 min 20 sec, or 6.837 x length of pipe tested, whichever is greater
27	12 min 45 sec, or 8.653 x length of pipe tested, whichever is greater
30	14 min 10 sec, or 10.683 x length of pipe tested, whichever is greater

E. Conduct leakage testing of manholes. Plug inverts and fill manhole with water. Allowable water drop in manhole to be field determined by utility and engineer. Minimum test duration is 1 hour.

3.07 Deflection Testing

A. Conduct pipeline deflection testing after the final backfill has been in place at least 30 days.

B. Maximum allowable pipe deflection is 5%. Measure deflection by manually pulling a mandrel through the pipe. The minimum mandrel diameter shall be in accordance with the following:

Sewer Pipe Nominal Size (In)	**Base Inside Diameter (In) (ASTM D3034 SDR 35 for Pipe 6" to 15", ASTM F679 T-1 for Pipe 18" to 27")**	**Minimum Mandrel Outer Diameter (In) for 5% Deflection Test**
6	5.742	5.45
8	7.665	7.28
10	9.563	9.08
12	11.361	10.79
15	13.898	13.20
18	16.976	16.13
21	20.004	19.00
24	22.480	21.36
27	25.327	24.06

C. Deflection testing is considered satisfactory if the mandrel can be pulled by hand through the pipe being tested. If the mandrel cannot be pulled through the pipe, replace or correct the pipe and retest until testing is satisfactory. Any pipe removed or corrected due to failing deflection testing shall also be re-tested for leakage.

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SECTION 02535

SANITARY SEWER FORCE MAIN SYSTEMS

PART 1 GENERAL

1.01 Section Includes

A. Piping and Fittings

B. Valves and appurtenances

C. Testing

1.02 Related Sections

Section 02320 - Trenching, Bedding and Backfilling

1.03 References

A. American Water Works Association (AWWA) and American National Standards Institute (ANSI) latest edition:

1. ANSI/AWWA C110/A21.10 - Ductile Iron and Gray Iron Fittings
2. ANSI/AWWA C111/A21.11 - Rubber Gasket Joints for D.I. Pipe and Fittings
3. ANSI/AWWA C153/A21.53 - Compact Ductile Iron Fittings
4. AWWA C500 - Gate Valves for Water and Sewer Systems
5. AWWA C900 - PVC Pressure Pipe, 4" - 12"
6. AWWA C905 - PVC Pressure Pipe, 14" - 36"
7. AWWA M23 - PVC Pipe Design and Installation Manual

B. American Society for Testing and Materials (ASTM) latest edition:

1. ASTM A307 - Carbon steel nuts and bolts
2. ASTM A536 - Ductile Iron Castings
3. ASTM D1248 - Polyethylene Plastics
4. ASTM D1784 - PVC Compounds
5. ASTM F1674 - Test Method for Joint Restraint Products for Use with PVC pipe.

C. UNI-BELL “Handbook of PVC Pipe”.

1.04 Submittals

A. Detailed layout drawings for all pipelines 6 inches and larger.

B. Details of joints for all piping 6 inches and larger.

C. Product data for gaskets for all piping.

D. Product data for all pipe over 6 inches in diameter.

E. Piping specialties and installation details.

F. Product data and installation procedures for joint and pipe restraint

G. Certification of pipe and fittings coatings

1.05 Product Delivery, Storage, and Handling

Exercise care in transporting and handling pipe and fittings in order to avoid damage to materials or coatings. Lifting shall be by hoist or on skids when hand lifting is not feasible. Dropping shall not be permitted. Store pipe as recommended by the manufacturer. Damaged pipe and fittings shall be replaced.

PART 2 PRODUCTS

2.01 Ductile Iron Pipe – Force Main shall be PVC Pipe

2.02 Fittings for Ductile Iron and PVC Pipe

A. Fittings shall be restrained mechanical joint ductile iron, conforming to ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53.

B. All full body (C110/A21.10) fittings shall be pressure rated to 250 psi, minimum. All compact fittings (C153/A21.53) shall be pressure rated to 350 psi, minimum.

C. Fitting joints shall be compatible with the type of pipe in use or specified, e.g., flange fittings for flange pipe and mechanical joint for mechanical joint pipe and push-on joint pipe.

D. Interior and exterior coatings of ductile iron pipe fittings shall be as specified in accordance with the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products". Ductile iron fittings shall have Protecto 401 lining.

2.03 Linings and Coatings for Ductile Iron Pipe and Fittings – N/A

2.04 Joints for Ductile Iron Pipe and Fittings – N/A

2.05 Restrained Joints for Ductile Iron Pipe and Fittings – N/A

2.06 PVC Pressure Pipe

A. Pipe 4 inch through 12 inch diameter shall conform to AWWA C900.

B. Pipe 14 inch through 36 inch diameter shall conform to AWWA C905.

C. Pipe shall conform to ASTM D1784, Type I, Grade I, 4000 psi design stress, and shall be National Sanitation Federation (NSF) approved.

D. Pipe shall be DR 18 with markings on each section showing conformance to the above specifications.

E. Pipe shall be color coded and stenciled (2 inch lettering on two sides of the pipe in at least three areas per pipe section). Pipe color to be "safety green", stenciled letters to be black, "Sewer Force Main".

F. Pipe Marking: Pipes shall have a manufacturer's home-mark on the spigot. On field cut pipe, the CONTRACTOR shall provide home-mark on the spigot in accordance with manufacturer's recommendations.

G. Any change in horizontal and vertical alignment shall be made with fitting, and shall be accounted for in the per linear price of pipe. No deflections are permissible in the construction and installation of PVC pipe.

2.07 PVC Pressure Pipe Joints

A. Joints shall be rubber gasketed conforming to AWWA C900 or C905

B. Pipe Bell shall be integral with the pipe and of equal or greater pressure rating, conforming to ASTM D3139. The bell of pipe and fittings using push-on joints shall have an integral groove to retain the gasket in place.

C. Provide adapters as required to join PVC pipe to pipe, fittings and equipment of other materials.

2.08 Restrained Joints for PVC Pressure Pipe

A. Restrained Joints: Restrained joint devices shall be made specifically for PVC pipe and meet or exceed the requirements in ASTM F-1674.

B. Mechanical devices shall be full circumferential contact compression type consisting of two rings connected across the pipe joint with restraining rods and associated hardware.

C. Pipe bell ring shall be a single piece ductile iron retainer ring that slides over the pipe lain end up to the pipe bell. The pipe plain end ring shall be a two piece ductile iron restrainer with a serrated-face to contact the pipe.

D. Restrainer shall be assembled on the pipe with side clamping bolts and nuts. The design tolerances to which the restrainer is machined will prevent over-tightening which would weaken or damage the pipe.

E. Ductile iron rings shall be ASTM A536, Grade 65-45-12. Connecting bolts shall be in accordance with ANSI/AWWA C111/A21.11.

G. Restraining devices shall be rated for a working pressure equivalent to the devices shall be as listed in of the "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

2.09 Polyethylene Encasement – N/A

2.10 General Valve Requirements

A. Where required for satisfactory operation of valves, provide valve operators, extension stems, stem guides, cast iron valve boxes, floor boxes, handwheels, operator stands, position indicators, and other valve appurtenances. Extension stems shall be complete with guide bearings, wrench nut, and tee handle wrench. All machinery stuffing boxes shall be packed with material selected for the service intended. Maintain all packing until final acceptance by the OWNER.

B. Manufacturer's name, size, and pressure marking shall be cast into the body.

C. Valve operators shall be sized for operation at the pressure and flow conditions required for proper operation.

D. Manual operators for exterior buried valves shall conform to AWWA C504.

E Valve shafts shall be one piece extended completely through the disc or stub shafts extending 1½ times the shaft diameter into the disc. Valve shaft diameter shall be as required by AWWA C504. Valve shafts shall be 304 or 316 stainless steel. Disc to stem connections or turned down portions of shafts shall be designed to transmit shaft torque equivalent to 75% of the required shaft diameter. Bushings shall be of reinforced Teflon, luberized bronze, or stainless steel. Seals may be preloaded by packing gland mechanism.

F. Manual valve operators shall be designed to hold the valve disc in any intermediate

position between fully opened and fully closed without creeping or fluttering. The operator shall be capable of transmitting sufficient torque to open or close each valve under the most adverse operating conditions. An indicating arrow shall be provided to give full closed, full open, or intermediate disc position indicators.

G. Extension stems shall be provided for all valves in buried locations and in other locations where indicated on the Drawings.

H. Extension stems shall be fabricated from solid steel shafting not smaller in diameter than the stem of the valve or from galvanized steel pipe having an internal diameter not smaller than the diameter of the valve stem. Stem couplings shall be both threaded and keyed to the coupled stems and shall be of standard design and construction. Pipe couplings will not be acceptable.

I. Stems for buried valves shall extend to within 6 inches of the surface of the ground. Each extension stem shall be connected to the valve operator with a suitable universal joint type coupling. All connections shall be pinned. Each extension stem shall be provided with spacers which will center the stem in a valve box having an inside diameter of approximately 5 inches, and shall be equipped with a standard AWWA wrench nut as described in AWWA C500, except where handwheels are indicated.

2.11 Linings and Coatings for Valves

A. Valves 4 inches and larger shall be lined and coated.

B. Interior lining for pipes and fittings shall be as listed on the latest "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

C. Exterior coating on buried valves shall be rust inhibiting epoxy primer, followed by a coal tar epoxy, total minimum dry film thickness of 16 mils, applied at the factory.

D. Exterior coating of exposed valves, including valves in wetwells and valve vaults shall be coated in accordance with System 5 of Section 09900. All surface preparation and coating shall be performed in the field. Paint color to be green.

2.12 Swing Check Valves – N/A

2.13 Plug Valves

A. Standard plug valves shall be of the eccentric design with operating hand wheels, extension stems, operator, operating nuts or wrenches required for normal operation.

B. Valves shall have the name of the manufacturer and the size of the valve cast or molded onto the valve body. A permanent plate shall be attached to the valve or

operator indicating serial number, order number, accessories, operator model and manufacturer, etc.

C. Eccentric plug valves shall be of the non-lubricated type with 80-percent port areas. The port area for valves 4 to 20 inches shall have a minimum of 80-percent nominal pipe diameter. Valves 24 inches and larger shall have a minimum port area of 70-percent of nominal pipe diameter.

D. Minimum pressure rating of valves 4 to 12 inches shall be 175 psi; valves 14 to 72 inches shall be 150 psi. Valve bodies shall be cast iron ASTM A 126, Class B. Valve ends shall be screwed, flanged or mechanical joint as indicated on the Drawings. Plugs shall be cast iron or ductile iron with neoprene facing and shall be of the single piece design. The plug shall be of the same configuration for all valves and shall require no stiffening member opposite the plug for balance or support. Valve body seats shall have a welded in overlay of not less than 90 percent nickel. Packing shall be adjustable and safely replaceable. Brushing shall be 316 stainless steel in both upper and lower journals. The valve should be capable of drip tight shut off with flow in either direction at the full pressure of the valve. All exposed nuts, bolts, springs and washers on buried service valves shall be stainless steel.

E. Valves shall be furnished with replaceable chevron packing, capable of being repacked with the line under pressure.

F. Valves 4 inches in diameter and smaller shall be lever or wrench nut operated. Valves larger than 4 inches shall be worm gear operated, except where automatic operation is specified.

G. Standard plug valves shall be as listed in the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

H. Valve Testing: Plug valves shall be tested in accordance with AWWA C504. Each valve shall meet the performance leakage and hydrostatic tests described in AWWA C504. The leakage test shall be applied to the face of the plug tending to unseat the valve. The manufacturer shall furnish certified copies of reports covering proof of design testing as described in AWWA C504.

2.14 Air Release Valves

A. Wastewater Combination Air Release Valve: The valve body shall be conical in shape and shall be 316 stainless steel with a funnel shape lower body to automatically drain sewage back to into system. All internal part shall be corrosion resistant 316 stainless steel or non-metallic plastic materials.

B. On flanged connections 316 stainless steel bolts, nuts and washers are to be used

along with the properly sized gaskets.

C. Valves shall be as listed in the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

2.15 Valve Boxes

A. Mains 12 inches and smaller and less than 6 feet in depth shall have cast-iron three-piece valve boxes. Valve boxes shall be provided with suitable heavy bonnets and shall extend to such elevation at or slightly above the finished grade surface as directed by Orange County.

B. An operating nut extension box shall be used for mains 16 inches and larger or when any size main has a buried valve with an operating nut 6 feet below finished grade. Valve boxes shall be one complete assembled unit composed of the valve box and extension stem. All moving parts of the extension stem shall be enclosed in a housing to prevent contact with the soil. Valve box assembly shall be adjustable to accommodate variable trench depths 6 feet and greater.

C. Valve stem assembly shall be of a telescoping design that allows for variable adjustment length. The material shall be galvanized square steel tubing. The stem assembly shall have a built-in device that prevents the stem assembly from disengaging at its fully extended length. The extension stem must be capable of surviving a torque test to 1,000 ft-lb without failure. The barrel shall be screw type only, having 5-1/4-inch shaft. The upper section shall have a flange at the bottom having sufficient bearing area to prevent settling and shall be complete with cast iron covers.

D. Valve boxes shall have locking lids.

E. All valve boxes in non-paved areas shall be installed with a valve collar as shown in the details.

F. Each valve collar shall utilize a test station box made into the valve collar for placement of locating wire as shown in the details.

G. Accessories include valves, collars, tracing wire and valve markers.

H. All valve box covers shall be painted in an approved manner with the primer paint rust primer and the finish paint shall be two coats of enamel to color as required by Orange County.

2.16 Pipeline Warning Tape

A. Pipe Identification: Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant and the class or strength

classification of the pipe. The marking shall be plainly visible on the pipe barrel. Pipe that is not clearly marked is subject to rejection. The CONTRACTOR shall remove all rejected pipe from the project site within five NORMAL WORKING DAYS.

B. Warning tape shall be an inert plastic film specifically formulated for prolonged underground use. Minimum thickness 4 mils, width 6 inches, letter size 1 inch. Lettering shall be continuous.

C. Tape shall be the standard product of a manufacturer regularly engaged in the supply of this tape.

D. Warning tape color and lettering shall be "SEWER FORCE MAIN", black printing on green background.

2.17 Locating Wire

Locating wire shall be color-coded 10 gauge continuous insulated wire. Color coding shall be similar to warning tape colors – green for force main.

2.18 Electronic Marker Balls

Electronic marker balls shall be installed on all force mains. Marker balls shall consist of a passive device capable of reflecting a specifically designated repulse frequency tuned to the utility being installed. Balls shall be four inches (4") in diameter with a green, high density polyethylene shell. Marker balls shall be in accordance with the latest edition of "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

PART 3 EXECUTION

3.01 General Installation Requirements

A. Pipe manufacturer shall provide training for CONTRACTOR's personnel on the proper methods of handling, installing, joining and backfilling of the force main pipe.

B. All lengths of pipe shall be dimensioned accurately to measurements established at the site, and shall be worked into place without springing or forcing.

C. Cut all pipe and drill all holes that may be necessary. Cut sections of pipe shall be reamed or filed to remove all burrs. The pipe interior and joints shall be thoroughly cleaned before being installed and kept clean during construction.

D. All changes in direction shall be made with fittings. Bending of pipe, except copper and polyethylene, is prohibited. Joint deflection is not permitted.

E. Any transition from one pipe size to another shall be made with a reducing fitting. Reducing bushings are prohibited except where specifically indicated on the Drawings or approved by the ENGINEER.

F. Make adequate provision for expansion and contraction of piping.

G. Trenching, bedding and backfilling shall be in accordance with Section 02320.

H. Valves shall be installed in all pipe ahead of appliances and equipment not furnished with stops, and elsewhere as required for proper control and isolation of sections of systems for maintenance purposes.

3.02 Concrete Cradles and Encasement

Concrete cradles and encasement shall be as indicated on the Drawings, or as directed by the ENGINEER. All concrete cradles and anchors shall be of Class B concrete.

3.03 Separation of Force Mains and Water Mains

A. Horizontal Separation

Existing and proposed water and sewer force mains shall be separated at least 10 feet horizontally. Horizontal separation between water mains and sewer force mains must always be a minimum of 10 feet unless a closer than 10 foot separation has been specifically detailed on construction drawings which have been approved under the FDEP permit.

B. Crossings

1. Whenever potable lines cross non-potable lines, the lines shall be installed to provide a minimum vertical distance of 18 inches measured from the outside of the potable line to the outside of the non-potable line. The potable line may be either above or below the non-potable line at crossings. The constructed pipeline shall be installed so that the pipeline joints are as far from the crossing as possible.

2. Reduction in the separation between water mains and force mains is not allowed unless the separation has been specifically detailed on construction drawings which have been approved under the FDEP permit.

3.04 Plugs

A. Installed piping systems shall be temporarily plugged at the end of each day's work, or other interruption to progress on a given line. Plugging shall be adequate to prevent entry of small animals or persons into the pipe or the entrance or insertion of

deleterious materials.

B. Standard plugs shall be inserted into all dead-end pipes, tees, or crosses; spigot ends shall be capped; flanged and mechanical joint ends shall have blind flanges of metal.

C. Plugs installed for pressure testing shall be blind flanges fully secured and blocked to withstand the test pressure.

D. Where plugging is required because of contract division or phasing for later connection, the ends of such lines shall be equipped with a permanent type plug or blind flange. Installation or removal of such plugging shall be considered incidental to the work.

3.05 Ductile Iron Pipe – N/A

3.06 Polyethylene Encasement Installation – N/A

3.07 Buried and Exposed Valves

A. Buried valves 6 inch diameter and larger shall be set on a foundation of solid concrete or stone not less than 8 inches thick nor less than one cubic foot in volume. Foundations shall be set on firmly compacted ground.

B. Height of the valve and its supporting foundation shall conform to height of connecting pipe. Valves shall be set in a vertical position unless otherwise indicated on the Drawings.

C. Exposed valves shall be installed in a vertical position wherever possible. Unless otherwise indicated or directed by the ENGINEER, valve stems shall never be below a horizontal position.

D. Open and close each valve observing full operation prior to installing successive lengths of pipe.

3.08 Air Release Valves

Air release valves shall be installed in the tops of pipes as indicated on the Drawings. Valve size, location and method of installation shall be indicated on the Drawings or as directed by the ENGINEER.

3.09 Installation of Warning Tape

Install warning tape along all pipelines. Install 2 feet above pipe, minimum of 1 foot below grade.

3.10 Locator Wire

Install locator wire along all pressurized pipelines 2" and larger. Loop wire into all valve boxes. Check wire for electrical continuity.

3.11 Locator Balls

Electronic markers shall be furnished and installed so that a marker will be located at one hundred foot (100') intervals along the pipeline length. Markers shall also be placed at changes in direction, tees, or other points of connection and as directed by the ENGINEER

3.12 Testing General Requirements

A. All testing shall be done in accordance with Section 04310 of the latest edition of the Orange County Utilities Standards and Construction Specification Manual.

B. Test procedures and method of disposal of water shall be approved by the ENGINEER. All tests shall be made in the presence of the ENGINEER and utility. Preliminary tests made by the CONTRACTOR without being observed by the ENGINEER will not be accepted. Notify the ENGINEER and the utility companies at least 48 hours before any work is to be inspected or tested.

C. All defects in piping systems shall be repaired and/or replaced and retested until acceptable. Repairs shall be made to the standard of quality specified for the entire system.

D. Sections of the system may be tested separately, but any defect which may develop in a section previously tested and accepted shall be promptly corrected and retested. Pressure tests shall be made between valves to demonstrate ability of valves to sustain pressure.

E. Provide all necessary test equipment. Increments on gauges used for pressure pipe testing shall be of scaled to the nearest 1 psi. Gauges and pumps shall be in good working order with no noticeable leaks.

F. Tests for any exposed piping shall be made before covering and insulation is placed.

G. Pressure and leakage test for buried piping shall be made after all jointing operations are completed and restraints have been in place at least seven days. Lines tested before backfill is in place shall be retested after compacted backfill is placed.

H. Sections of piping between valves and other short sections of line may be isolated for testing. If shorter sections are tested, test plugs or bulkheads required at the ends of the test section shall be furnished and installed by CONTRACTOR, together with all anchors, braces, and other devices required to withstand the hydrostatic pressure without imposing any thrust on the pipe line. CONTRACTOR shall be solely

responsible for any damage which may result from the failure of test plugs or supports.

I. All items including valves and controls shall be given a thorough test. The entire system shall be operated for two days to prove compatibility of equipment and to achieve proper adjustment for operation. Valves, pipes, tanks, and other items that are non-operating or occasional-operating shall be tested for ability to meet design criteria.

J. If requested by Orange County, a sample of pipe to be tested shall be selected at random by Orange County or the testing laboratory hired by Orange County.

K. When the samples tested conform to applicable standards, all pipe represented by such samples shall be considered acceptable based on the test parameters measured. Copies of test reports shall be available before the pipe is installed on the project.

L. In the event that any of the test samples fail to meet the applicable standards, all pipe represented by such tests shall be subjected to rejection. The CONTRACTOR may furnish two additional test samples from the same shipment or delivery, for each sample that failed and the pipe will be considered acceptable if all of these additional samples meet the requirements of the applicable standards. All such retesting shall be at the CONTRACTOR'S expense.

M. Pipe that has been rejected by Orange County shall be removed from the site of the work by the CONTRACTOR and replaced with pipe that meets these specifications.

3.13 Pressure and Leakage Testing (PVC and DI Mains)

A. Piping shall be slowly filled with water and all air expelled. Care shall be taken that all air valves are installed and open in the section being filled, and that the rate of filling does not exceed the venting capacity of the air valves.

B. Apply hydrostatic test pressure of 100 psi for 10 minutes and for such additional period necessary for the ENGINEER to complete the inspection of the line under test. Do not exceed pipe manufacturer's suggested time duration at the test pressure. If defects are noted, repairs shall be made and the test repeated until all parts of the line withstand the test pressure.

C. Apply leakage test pressure of 100 psi. Maintain pressure at a maximum variation of 5% during the entire leakage test. The duration of the leakage test shall be two hours minimum, and for such additional time necessary for the ENGINEER to complete inspection of the section of line under test. Leakage measurements shall not be started until a constant test pressure has been established. The line leakage shall be measured by means of a water meter installed on the supply side of the pressure pump.

D. No leakage is allowed in exposed piping, buried piping with flanged, threaded, or welded joints or buried non-potable piping in conflict with potable water lines.

E. Tested sections of buried piping with slip-type or mechanical joints will not be accepted if the tested sections have a leakage rate in excess of that rate determined by the formula:

1. AWWA C-600 Ductile Iron Mains $L = \frac{SDP}{133{,}200}$

2. AWWA Manual No. M-23 - PVC Main $L = \frac{NDP}{7{,}400}$

L = Maximum permissible leakage rate, in gallons per hour, throughout the entire length of line being tested.

S = Length of line tested (in feet).

D = Nominal internal diameter (in inches) of the pipe.

P = The square root of the actual pressure in psig on all joints in the tested portion of the line. This actual pressure shall be determined by finding the difference between the average elevation of all tested pipe joints and the elevation of the pressure gauge and adding the difference in elevation head to the authorized test pressure.

F. All apparent leaks discovered within one year from the date of final acceptance of the work by the OWNER shall be located and repaired by CONTRACTOR, regardless of the total line leakage rate.

END OF SECTION

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SECTION 02605

PRECAST STRUCTURES AND ACCESSORIES

PART 1 GENERAL

1.01 Section Includes

A. Precast sanitary manhole structures

B. Pump Station Wet Wells and Vaults

C. Precast structure grates, access covers, and accessories

D. Precast structure linings and coatings

1.02 Related Sections

A. Section 02320 - Trenching, Bedding, and Backfilling

B. Section 09871 - Interior Protective Lining for Concrete Structures

1.03 References

American Society for Testing and Materials (ASTM) latest edition:

A. A48 - Gray Iron Castings

B. A185 - Steel Welded Wire Reinforcement, Plain, for Concrete

C. C216 - Facing Brick

D. C270 - Mortar for Unit Masonry

E. C478 - Precast Reinforced Concrete Manhole Sections

1.04 Submittals

A. All gratings and castings

B. Precast structures

C. Coatings and Linings for precast structures

D. Connections to precast structures

PART 2 PRODUCTS

2.01 General

A. Concrete shall have minimum 4000 psi compressive strength.

B. Add crystalline waterproofing admixture during the mixing cycle of concrete for wet well, valve vault and manhole pre-cast structures in accordance with the manufacturer's recommendation. Admixture shall be Xypex Admix C-1000-R with red dye, Kryton KIM or an acceptable equal.

C. Welded wire fabric shall conform to ASTM A185. Use 4 x 4 - W4 x W4 welded wire fabric unless otherwise indicated.

D. Integrally cast steps within precast structures are not allowed.

E. Date of manufacture and the name or trademark of manufacturer shall be clearly marked on each precast section.

2.02 Bases

A. Bases shall be one-piece precast base sections consisting of integrally cast slab, bottom ring section and concrete flow channels. Base sections shall have integral inverts with gaskets to match the pipe. CONTRACTOR shall be responsible for determining all invert angles. Provide outlet stubs with joints to match the pipe.

B. If angles are such that a one-piece base section is not feasible, separate base, ring and flow channel may be used if approved by the ENGINEER.

2.03 Risers

A. Risers shall be precast reinforced concrete per ASTM C478, manufactured using sulfate resistant cement (ASTM C150, Type II).

B. Risers shall be 48 inch diameter unless otherwise indicated and shall have a minimum wall thickness of 5 inches.

C. Gaskets for seating precast sections shall be cold adhesive preformed plastic gaskets conforming to FDOT Specification 942-2.

2.04 Cones and Tops

Unless otherwise indicated, cone top sections shall be precast, eccentric type with 24 inch diameter top opening conforming to ASTM C478. Provide 8-inch minimum thickness flat

slab tops with eccentric 24 inch diameter opening, unless otherwise indicated.

2.05 Pump Station Wet Well

A. Base, riser, and top shall be in accordance with details on the Drawings.

B. All precast construction shall be in accordance with ASTM C-478, minimum wall thickness of 6 inches.

C. Wet well liners shall be as specified in Section 09871 - Interior Protective Lining for Concrete Structures.

D. Gaskets shall be Ram-Nek type and to be used at all joints on wet well riser.

2.06 Pump Station Valve Vault

A. Valve vaults shall be precast with concrete and reinforcement conforming to ASTM C478.

B. Interior of valve vault shall be lined as specified in Section 09871 - Interior Protective Lining for Concrete Structures.

2.07 Manhole Frames and Lids

A. Frames and covers shall be gray iron per ASTM A48, Class 30B and shall be US Foundry Type 227AS, traffic bearing (AASHTO H-20 loading), unless otherwise noted in the Drawings. Raised lettering on covers shall be "SEWER", or as detailed on the Drawings.

B. Castings shall be smooth, clean, free from blisters, blowholes, shrinkage.

2.08 Catch Basin Inlets, Frames, and Grates - Not Used

2.09 Sanitary Manhole Coatings and Finishes

A. Interior of manholes which receive force main discharge - integrally attached interior liner, full height, as specified in Section 09871 - Interior Protective Lining for Concrete Structures and "Orange County Utilities Standards and Construction Specifications Manual, Appendix D – List of Approved Products".

PART 3 EXECUTION

3.01 Manhole, Inlet and Wet Well Installation

A. Install required bedding.

B. Install base to proper elevation and alignment. Handle precast sections by lift rings only. Remove lift rings and fill all holes with non-shrink grout after erection.

C. Pour invert immediately after setting first section of barrel.

D. Prior to setting subsequent barrel sections, apply primer to tongue and groove ends and allow to set in accordance with manufacturer's recommendations. Wrap lightly around casting joints and apply high intensity propane torch to effectively seal joints from groundwater infiltration.

E. Apply coatings and liners as required.

F. Backfill in accordance with Section 02320.

3.02 Installation of Castings

A. Manhole castings to be fully embedded in mortar with adjustment brick courses placed between the frame and manhole, minimum of 2 courses, maximum of 4 courses. Mortar shall conform to ASTM C270, type M, brick to conform to ASTM C216, grade SW, size 3 ½" (w) x 8" 9L) x 2 ¼" (h).

B. Top of manhole castings in paved areas, including driveways and sidewalks to be flush with grade. Top of manhole castings outside paved areas to be 2 inches above grade, unless otherwise noted on the Drawings.

3.03 Channels

Manhole flow channels shall be smooth with carefully shaped bottoms, built up sides and benching constructed using cement and brick with no voids. Channels shall conform to the dimension of the adjacent pipe and provide changes in size, grade, and alignment evenly. Cement shall be Portland Cement Type II only.

3.04 Pipe Connections

Special care shall be taken to see that the openings through which pipes enter the structure are provided with watertight connections. For ductile iron and PVC pipe, connections shall conform to ASTM C 923, "Standard Specifications for Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes."

3.05 Cleaning

All newly constructed manholes shall be cleaned of any accumulation of silt, debris, or foreign matter of any kind shall be free from such accumulations at the time of final inspection.

END OF SECTION

SECTION 02650

RETIREMENT, REMOVAL, SALVAGE, AND DISPOSAL OF EXISTING PIPE

PART 1 GENERAL

1.01 THIS TECHNICAL SPECIAL PROVISION INCLUDES

Scope of Work: Furnish all labor, materials, equipment and incidentals required to retire, remove, salvage and/or dispose of existing pipelines as shown on the Drawings and as specified herein.

1.02 Definitions

A. Pipeline Abandonment - isolate from active pipelines, remove from service, dispose of pipeline contents, plug pipeline, grout and leave pipe in place.

B. Pipeline Removal - isolate from active pipelines, remove from service, dispose of pipeline contents, remove pipe, valves, fittings, dispose or stockpile removed materials as required.

1.03 Quality Assurance

A. Permits and Licenses: Contractor shall obtain and pay respective fees for all necessary permits and licensed for performing the Work and shall furnish a copy of same to OCU and the Engineer prior to commencing the Work. The Contractor shall comply with the requirements of the permits. A licensed asbestos abatement Contractor or subcontractor registered in the State of Florida shall perform all removal or retirement of asbestos pipe material, if encountered. All work associated with asbestos material shall be performed in accordance with local, State, or Federal standards.

B. Notices: Contractor shall issue written notices of planned work to companies or local authorities owning utility conduit, wires or pipes running to or through the project site. Copies of said notices shall be submitted to the Utility, OCU and the Engineer.

C. Quality Control

1. It shall be the responsibility of the Contractor to provide supervision and inspections to ensure that the existing piping is removed and disposed, salvaged or retired as designated in the Drawings and as specified herein.

1.04 Submittals

A. Shop Drawings

1. Shop drawings shall be submitted to the Utility OCU and the Engineer for approval prior to construction in accordance with the General Conditions and Division 1 for the following:

a. Grout
b. Caps and Plugs

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION

3.01 Preparation

Implement traffic control measures prior to construction activities.

3.02 Pipe Isolation

A. Where indicated on the Drawings, line stops shall be utilized to isolate portions of pressurized mains.

B. In lieu of line stops, the use of existing valves may be used to isolate portions of the pipeline. Provide a written proposal showing existing valves to be closed to provide isolation. Review of proposal will be conducted by Utility Engineer to determine affected area. In no case will service to residences and businesses affected by the isolation be allowed to be interrupted by more than 1 hour.

C. Line stops shall be completed while the pipelines are pressurized.

D. Line stops shall consist of a line stop fitting, stopping valve, blind flange for installation after stop is completed, and 1-inch equalization/purge fitting. Line stop sleeves and appurtenances shall be 304 stainless steel.

E. Provide additional pipe restraining in the vicinity of the line stop for preventing pipe movement due to any unbalanced forces created by the line stop and subsequent cutting and removal of existing pipe adjacent to any line stop.

F. In the event a pressurized potable water pipeline that will remain in service loses pressure to less than 20 psi, disinfect the water main and submit bacteriological test results to the Florida Department of Environmental Protection. Satisfactory test results are required to be submitted for tests conducted on two consecutive days.

3.03 Retirement, Removal, Salvage, and Disposal

A. Contractor shall uncover and remove existing pipe as shown on the Drawings. No pipe shall be removed until the new pipe is installed and placed in operation.

B. Removal: Existing pipe and structures designated to be removed on the Drawings shall be completely drained and the contents properly disposed. The existing pipe shall then be completely removed by the Contractor and disposed from the site. The existing structures, connected to piping designated to be retired and connected to piping designated to be removed, shall then either be completely removed by the Contractor and disposed from the site or completely removed and salvaged by the Contractor for OCU's use as follows:

1. Piping and structures to be removed and disposed of:

    a. Existing pipe designated to be removed and disposed of as shown on the Drawings.

    b. Existing air release valve vaults and associated miscellaneous metal.

2. Piping and Structures to be Removed and Salvaged: The pipe and structures shall be thoroughly pressure washed, palletized on wooden skids to a dimension not exceeding the recommendation of the manufacturer, and conveyed to OCU at the location designated by OCU.

    a. Existing air release valves.

    b. Existing air release valve vault and sanitary manhole rings and covers.

    c. Existing valve boxes.

    d. Fire hydrant and valve assemblies.

C. At locations where pipe is removed, install ductile iron plug fitting on remaining pipe. Pour concrete thrust restraint block or implement other restraining measures to prevent pipe movement.

D. All pipe left in place shall be grouted. Grout shall meet FDOT Section 121. Grouted pipe shall be as-built and at all locations where pipe is exposed as needed for grouting.

E. Asbestos Pipe

1. All work associated with the removal or taking out of service of existing asbestos cement pipelines shall be performed by a licensed asbestos abatement contractor or subcontractor registered in the State of Florida (if required). Licensure as an asbestos consultant or contractor is not required for the repair, maintenance, removal, or disposal of asbestos-containing pipe or conduit.

2. The asbestos abatement contactor or subcontractor shall contact the Orange County Environmental Protection Division prior to removal or retirement of any asbestos material and shall obtain all required permits and licenses and issue all required notices as required by the Orange County Environmental Protection Division. The Contractor shall be responsible for all fees associated with permits, licenses and notices to the governing regulatory agencies.

3. The asbestos abatement contractor or subcontractor shall contact the

Department of Environmental Protection (DEP) in Tallahassee and Orange County, prior to removal or retirement of any asbestos material and shall obtain all required permits and licenses and issue all required notices as required by DEP. The Contractor shall be responsible for all fees associated with permits, licenses and notices to the governing regulatory agencies.

4. Post warning signs around the perimeter of all asbestos work area enclosures and support areas. Warning signs shall conform to OSHA requirements for size and wording.

5. All workers that perform tasks that result in asbestos exposure shall wear respirators in accordance with OSHA requirements.

6. Preventing dust dispersion is the primary means of controlling the spread of asbestos. Whenever practical, the point of pipe cutting and or removal shall be isolated, enclosed, covered, or shielded from the workers in the area.

7. Wet methods, or wetting agents, to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup is required.

8. Where asbestos containing material is to be removed, the material shall be thoroughly wetted prior to and during its removal. The material shall be removed in an intact state unless the Contractor demonstrates that intact removal is not possible.

9. Prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers is required. Waste asbestos containing materials shall be bagged using two layers of 6 mil plastic bags and is to be sealed. The material must remain saturated until the waste container is sealed.

10. Removed asbestos containing materials shall be disposed of offsite, and the disposal is to meet all local and state requirements.

END OF SECTION

SECTION 02740

PAVING

PART 1 GENERAL

1.01 Section Includes

A. Asphalt pavement, including binder and surface course.

B. Repair and restoration of existing paving, curbing, driveways, and sidewalks.

C. Paving and temporary paving timing requirements.

1.02 References

Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction, 2000 and 2004 editions.

A. Section 320 - Hot Bituminous Mixtures - Plant, Methods, and Equipment (2000 and 2004 Editions)
B. Section 330 - Hot Bituminous Mixtures - General Construction Requirements (2000 and 2004 Editions)
C. Section 331 - Type S Asphalt Concrete (2000 Edition)
D. Section 334 - Superpave Asphalt Concrete (2004 Edition)
E. Section 901 - Coarse Aggregate (2000 and 2004 Editions)
F. Section 902 - Fine Aggregate (2000 and 2004 Editions)
G. Section 916 - Bituminous Materials (2000 and 2004 Editions)
H. Section 917 - Mineral Filler (2000 and 2004 Editions)

1.03 Submittals

A. Submit proposed design mix for review and approval. Submit for each proposed mix the following: Gradation analysis; Grade of asphalt cement used; Marshall Stability in pounds flow.

B. Provide a single percentage of asphalt by weight of total mix intended to be incorporated in the completed mixture, shown to the nearest 0.1%. For structural mixes (S-1, S-3) establish the optimum asphalt content at a level corresponding to a minimum of 4.5% air voids. For FC-3 mixes, establish optimum asphalt content at a level corresponding to a minimum of 5.0% air voids.

C. Provide the laboratory density of the asphalt mixture for all mixes except Open-Graded Friction Courses.

D. Identify source and description of the materials to be used.

E. Provide certification that the mix design conforms to specification requirements.

1.04 Quality Assurance

A. Field compaction density and thickness testing frequencies of the asphalt shall be tested once every 300 linear feet of paving per 24-ft wide strip, staggered left, center and right of centerline. Where less than 300 linear feet of asphalt is placed in one day, provide minimum of one test for each per day's construction at a location designated by the ENGINEER.

B. Asphalt extraction gradation shall be tested from grab samples collected once every 1800 square yards of asphalt delivered to the site, or a minimum of once per day. Obtain the results in a timely manner (no later than the end of the day) so that adjustments can be made if necessary.

C. On initial use of a Type S or FC-3 mix design at a particular plant, as a minimum, run an additional extraction gradation analysis if more than 500 tons [450 metric tons] of mixture are produced on the first day of production.

D. Tolerances for Quality Control Tests (Extraction Gradation Analysis) shall be in accordance with FDOT Specification Section 331.

1.05 Project Conditions

A. Apply prime and tack coats when ambient or base surface temperature is above 40 F, and when temperature has been above 35 F for 12 hours immediately prior to application. Do not apply when base is wet, contains excess moisture, or during rain.

B. Construct asphaltic concrete paving when ambient temperature is above 45 F.

C. Do not spread the mixture when the wind is blowing to such an extent that proper and adequate compaction cannot be maintained or when sand, dust, etc., are being deposited on the surface being paved to the extent that the bond between layers will be diminished.

PART 2 PRODUCTS

2.01 General

A. This project requires Type S Asphalt Concrete (Type S-1 or S-3). The equivalent fine Type SP (Superpave) Asphalt Concrete mixture (Traffic Level C) meeting the requirements of FDOT Specification Section 334 may be selected as an alternate at no additional cost to the OWNER. The equivalent mixes are as follows:

1. Type S-1: Type SP-12.5
2. Type S-3: Type SP-9.5

B. Asphalt plant and equipment shall meet the requirements in FDOT Specification Section 320.

2.02 Aggregate

A. Coarse Aggregate, Stone, Slag or Crushed Gravel shall meet the requirements in FDOT Specification Section 901.

B. Fine Aggregate shall meet the requirements in FDOT Specification Section 902.

C. Aggregate gradation shall meet the following:

Bituminous Concrete Mixtures (Gradation Design Range)								
Type	Total Aggregate Passing Sieves[1]							
	3/4 inch [19.0 mm]	1/2 inch [12.5 mm]	3/8 inch [9.5 mm]	No. 4 [4.75 mm]	No. 10 [2.0 mm]	No. 40 [425 µm]	No. 80 [180 µm]	No. 200 [75 µm]
S-1[4]	100	88-98	75-93	47-75	31-53	19-35	7-21	2-6
S-3[4]		100	88-98	60-90	40-70	20-45	10-30	2-6
ABC-1		100						0-12
ABC-2		100			55-90			0-12
ABC-3[2]	70-100			30-70	20-60	10-40		2-10
FC-2[3]		100	85-100	10-40	4-12			2-5
FC-3[4]		100	88-98	60-90	40-70	20-45	10-30	2-6

[1] In inches [mm] or sieves [µm].
[2] 100% passing 1 1/2 inch [37.5 mm] sieve.
[3] The ENGINEER may increase the design range for the No. 10 [2.00 mm] sieve for lightweight aggregates.
[4]The ENGINEER may retain up to 1% on the maximum sieve size.

D. Use clean aggregate containing no deleterious substances. Do not use coarse or fine aggregate which contains more than 0.5% of phosphate.

E. In laboratory tests, and for the purpose of proportioning the paving mixture, consider all material passing the No. 10 [2.00 mm] sieve and retained on the No. 200 [75 µm] sieve as fine aggregate, and the material passing the No. 200 [75 µm] sieve as mineral filler.

F. Do not use any screenings in the combination of aggregates containing more than 15% of material passing the No. 200 [75 µm] sieve. When two screenings are

blended to produce the screening component of the aggregate, one of such screenings may contain up to 18% of material passing the No. 200 [75 μm] sieve, as long as the combination of the two does not contain over 15% material passing the No. 200 [75 μm] sieve. Screenings may be washed to meet these requirements.

2.03 Asphalt Cement

A. Superpave PG Asphalt Binder or Recycling Agent shall meet the requirements in FDOT Specification Section 916.

B. Mineral Filler shall meet the requirements in FDOT Specification Section 917

C. Marshall design mix shall be in accordance with the following:

Marshall Design Properties For Bituminous Concrete Mixes						
Mix Type	Minimum Marshall Stability (lbs.)	Flow* (0.01 in)	Minimum VMA (%)	Air Voids (%)	Minimum Effective Asphalt Content (%)	VFA Voids Filled with Asphalt (%)
S-1	1,500	8-13	14.5	4-5	**	65-75
S-3	1,500	8-13	15.5	4-6	**	65-75
ABC-1	500	7-15	15	5-16	6.0	-
ABC-2	750	7-15	15	5-14	5.5	-
ABC-3	1,000	8-13	14	4-7	**	65-78
FC-2	-	-	-	-	-	-
FC-3	1,500	8-13	15.5	4-6	**	65-75

*The maximum Flow value during production shall not exceed one point more than shown in the Table.
**The ratio of the percentage by weight of total aggregate passing the No. 200 sieve to the effective asphalt content expressed as a percentage by weight of total mix shall be in the range of 0.6 to 1.2.

2.04 Bituminous Mixture

Use a bituminous mixture composed of a combination of aggregate (coarse, fine or mixtures thereof), mineral filler, if required, and bituminous material. Ensure that not more than 20% by weight of the total aggregate used is silica sand or local materials as defined in FDOT Specification Section 902. Size, grade and combine the several aggregate fractions in such proportions that the resulting mixture meets the grading and physical properties of the verified mix design.

PART 3 EXECUTION

3.01 General

A. Meet the general construction requirements specified in FDOT Specification Section 330.

B. Spread the mixture only when the surface upon which the mixture is to be laid has been previously prepared, is intact, firm, and properly cured, and is dry. Do not spread mixture that cannot be finished and compacted during daylight hours.

C. Deliver the asphalt cement to the asphalt plant at a temperature not to exceed 350^{o}F and equip the transport tanks with sampling and temperature sensing devices meeting the requirements of FDOT. Maintain the asphalt cement in storage within a range of 230 to 350^{o}F in advance of mixing operations. Maintain constant heating within these limits, and do not allow wide fluctuations of temperature during a day's production.

D. Produce a homogeneous mixture, free from moisture and with no segregated materials, that meets all specification requirements for the mixture, including compliance with the Marshall Properties. Also apply these requirements to all mixes produced by the drum mixer process and all mixes processed through a hot storage or surge bin, both before and after storage.

3.02 Preparation of Application Surfaces

A. Prior to the laying of the mixture, clean the surface of the base or pavement to be covered of all loose and deleterious material by the use of power brooms or blowers, supplemented by hand brooming where necessary.

B. Where an asphalt mix is to be placed on an existing pavement or old base which is irregular, and wherever the plans indicate, bring the existing surface to proper grade and cross-section by the application of patching or leveling courses.

C. Where an asphalt mix is to be placed over a newly constructed surface treatment, sweep and dispose of all loose material from the paving area.

D. Paint all structures which will be in actual contact with the asphalt mixture, with the exception of the vertical faces of existing pavements and curbs or curb and gutter, with a uniform coating of asphalt cement to provide a closely bonded, watertight joint.

E. Apply a tack coat, as specified in FDOT Specification Section 300, on existing pavement structures that are to be overlaid with an asphalt mix and between successive layers of all asphalt mixes.

3.03 Placing Mixture

A. Lay all asphaltic concrete mixtures, including leveling courses, other than adjacent to curb and gutter or other true edges, by the stringline method to obtain an accurate, uniform alignment of the pavement edge.

B. For each paving machine operated, use a separate crew, each crew operating as a full unit. The CONTRACTOR's Certified Paving Technician in charge of the paving operations may be responsible for more than one crew but must be physically accessible to the ENGINEER at all times when placing mix.

C. Check the depth of each layer at frequent intervals, and make adjustments when the thickness exceeds the allowable tolerance. When making an adjustment, allow the paving machine to travel a minimum distance of 32 feet to stabilize before the second check is made to determine the effects of the adjustment.

D. In limited areas where the use of the spreader is impossible or impracticable, the CONTRACTOR may spread and finish the mixture by hand.

E. Straightedge and back-patch after obtaining initial compaction and while the material is still hot.

F. Upon arrival, dump the mixture in the approved mechanical spreader, and immediately spread and strike-off the mixture to the full width required, and to such loose depth for each course that, when the work is completed, the required weight of mixture per square yard [square meter], or the specified thickness, is secured. Carry an excess amount of mixture ahead of the screed at all times. Hand rake behind the machine as required.

G. Construct each course in layers of the thickness shown on Roadway and Traffic Design Standards, Index No. 513.

H. Before starting any rolling, check the surface; correct any irregularities; remove all drippings, fat sandy accumulations from the screed, and fat spots from any source; and replace them with satisfactory material. Do not skin patch. When correcting a depression while the mixture is hot, scarify the surface and add fresh mixture.

3.04 Application of Leveling Courses

A. Before spreading any leveling course, fill all depressions in the existing surface more than 1 inch deep by spot patching with leveling course mixture, and then compact them thoroughly.

B. Place all courses of leveling by the use of two motor graders, equip one with a spreader box. Use other types of leveling devices after they have been approved by the ENGINEER.

C. When the total asphalt mix provided for leveling exceeds 50 lb/yd^2 [27 kg/m^2], place the mix in two or more layers, with the average spread of any layer not to exceed 50 lb/yd^2 [27 kg/m^2]. When using Type S-3 Asphaltic Concrete for leveling, do not allow the average spread of a layer to be less than 50 lb/yd^2 [27 kg/m^2] or more than 75 lb/yd^2 [40 kg/m^2]. The quantity of mix for leveling shown in the plans represents the average for the entire project; however, the Contractor may vary the rate of application throughout the project as directed by the ENGINEER. When leveling in connection with base widening, the ENGINEER may require placing all the leveling mix prior to the widening operation.

3.05 Compacting Mixture

A. Coverage is the number of times the roller passes over a given area of pavement. Regardless of the rolling procedure used, complete the final rolling before the surface temperature of the pavement drops below 160^{o}F.

B. Seal Rolling: Provide two coverages with a tandem steel-wheeled roller (either vibratory or static), weighing 5 to 12 tons, following as close behind the spreader as possible without pick-up, undue displacement, or blistering of the material. Use vibratory rollers in the static mode for layers of 1 inch or less in thickness.

C. Intermediate Rolling: Provide five coverages with a self-propelled pneumatic-tired roller, following as close behind the seal rolling operation as the mix will permit.

D. Final Rolling: Provide one coverage with a tandum steel-wheeled roller (static mode only), weighing 5 to 12 tons, after completing the seal rolling and intermediate rolling, but before the surface pavement temperature drops below 160^{o}F.

E. Operate the self-propelled, pneumatic-tired roller at a speed of 6 to 10 mph. For each roller, do not exceed an area of coverage of 4,000 yd^2/h if rolling Type S Asphaltic Concrete, do not exceed an area of coverage of 3,000 yd^2/h.

F. Use a sufficient number of self-propelled pneumatic-tired rollers to ensure that the rolling of the surface for the required number of passes does not delay any other phase of the laying operation and does not result in excessive cooling of the mixture before completing the rolling. In the event that the rolling falls behind, discontinue the laying operation until the rolling operations are sufficiently caught up.

G. Use hand tamps or other satisfactory means to compact areas which are inaccessible to a roller, such as areas adjacent to curbs, headers, gutters, manholes, etc.

H. Use self-propelled pneumatic-tired rollers to roll all patching and leveling courses. Where placing the initial leveling course over broken concrete pavement, use a pneumatic-tired roller that weighs at least 15 tons. For Type S-3 Asphaltic Concrete leveling courses, use a steel-wheeled roller to supplement the traffic rollers. On other leveling courses, use a steel-wheeled roller to supplement the traffic rollers on all passes after the first pass.

I. Do not allow the rollers to deposit gasoline, oil, or grease onto the pavement. Remove and replace any areas damaged by such deposits as directed by the ENGINEER. While rolling is in progress, test the surface continuously, and correct all discrepancies to comply with the surface requirements. Remove and replace all drippings, fat or lean areas, and defective construction of any description. Remedy depressions that develop before completing the rolling by loosening the mixture and adding new mixture to bring the depressions to a true surface. Should any depression remain after obtaining the final compaction, remove the full depth of the mixture, and replace with sufficient new mixture to form a true and even surface. Correct all high spots, high joints, and honeycombing as directed by the ENGINEER. Remove and replace any mixture remaining unbonded after rolling. Correct all defects prior to laying the subsequent course.

J. Use a self-propelled pneumatic-tired roller on the first structural layer placed on a milled surface. Compact with a minimum of three passes.

3.06 Joints

A. Place the mixture as continuously as possible. Do not pass the roller over the unprotected end of the freshly laid mixture except when discontinuing the laying operation long enough to permit the mixture to become chilled. When thus interrupting the laying operation, construct a transverse joint by cutting back on the previous run to expose the full depth of the mat.

B. For all layers of pavement except the leveling course, place each layer so that longitudinal construction joints are offset 6 to 12 inches laterally between successive layers.

C. When laying fresh mixture against the exposed edges of joints (trimmed or formed as provided above), place mixture in close contact with the exposed edge to produce an even, well-compacted joint after rolling.

3.07 Surface Requirements

A. Obtain a smooth surface on all pavement courses placed, and then straightedge all intermediate and final courses with a 15 foot rolling straightedge. Furnish a 15 foot [4.572 m] manual straightedge, and make the straightedge available at the job site at all times during the paving operation for checking joints and surface irregularities.

B. Produce a finished surface of uniform texture and compaction with no pulled, torn, or loosened portions and free of segregation, sand streaks, sand spots, or ripples.

3.08 Acceptance Requirements

A. Upon completion of the final surface or friction course test the finished surface with a 15 foot rolling straightedge. Correct all deficiencies in excess of 3/16 inch.

B. If correction is made by removing and replacing the pavement, remove the full depth of the course and extend at least 50 feet on either side of the defective area for the full width of the paving lane.

C. If correction is made by overlaying, cover the length of the defective area and taper uniformly to a featheredge thickness at a minimum distance of 50 feet on either side of the defective area. Extend the overlay the full width of the roadway. Maintain the specified cross slope. Adjust, as necessary, the mix used for the overlay for this purpose.

D. Maximum deficiency from the specified thickness as follows:

1. For pavement of a specified thickness of 2½ inches or more: ½ inch
2. For pavement of a specified thickness less than 2 ½ inches: ¼ inch

E. Where the deficiency in thickness is: (1) in excess of 3/8 inch for pavement of less than 2½ inches in specified thickness, or (2) in excess of ¾ inch for pavement of specified thickness of 2 ½ inches or more, correct the deficiency either by replacing the full thickness for a length extending at least 50 feet from each end of the deficient area.

F. For any case of excess deficiency of the pavement, if approved by the ENGINEER for each particular location, correct the deficient thickness by adding new surface material, and compact the material to the same density as the adjacent surface. ENGINEER will determine area to be corrected and thickness of new material added.

3.09 Repair and Restoration

Replace pavement or roadway surfaces cut or damaged to equal or better condition than the original, including stabilization, base course, surface course, curb and gutter, and other appurtenances.

3.10 Sequencing and Temporary Paving

A. Install subgrade and base course materials within 48 hours of the removal/open cutting of existing pavement consisting of streets, driveways, or sidewalk. Install final surface courses within 14 days after removal of existing pavement.

B. Areas to receive asphalt shall receive erosion control measures no later than 48 hours after installation of base course. Temporary erosion control consists of placement of a bituminous prime coat and sanding the surface. Permanent erosion control consists of placement of the structural course.

C. Areas to receive concrete paving shall be either protected with a layer of FDOT coarse aggregate material or shall be paved within 48 hours of installation of the subgrade.

3.11 Field Quality Control

Test density of bituminous concrete mixes. Type S-1 and S-3 asphalt are to be a minimum density of 96% of the laboratory density.

END OF SECTION

SECTION 02820

FENCES AND GATES

PART 1 GENERAL

1.01 Section Includes

A. General Fence Requirements

B. Fence Gates

1.02 References

Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction and Roadway and Traffic Design Standards, latest implemented editions:

A. Index No. 802 - Fence Type B

B. Specification Section 550 - Fencing

1.03 Scope of Work

Furnish all materials, equipment, transportation, tools and labor, unless otherwise specified, to construct fencing and other appurtenances, and all items called for or that could reasonably be inferred from the Drawings, including fabric, posts, frame, bracing, gates and all accessories for a complete job ready to operate. If any items for a complete job are omitted or not shown, the CONTRACTOR shall furnish and install the same without cost to the OWNER.

1.04 Submittals

A. Provide product data and shop drawings for all posts, rails, chain link fence fabric, tension wire, gates.

B. Provide drawings indicating the location of all pull posts and gate locations.

PART 2 PRODUCTS

2.01 General

All fence and gate material shall be FDOT Fence Type B, per FDOT Roadway and Traffic Design Standards and Standard Specifications for Road and Bridge Construction. Per these standards, there are a number of options for the fence materials. Listed below are the material options selected by the OWNER to be used for this project.

2.02 Line Posts

A. Zinc galvanized steel pipe (galvanized at 1.8 oz per square foot), Schedule 40, vinyl coated black, class A bonded.

B. Required size is 2 inch nominal diameter.

2.03 Corner, End, and Pull Posts

A. Zinc galvanized steel pipe (galvanized at 1.8 oz per square foot), Schedule 40, vinyl coated black, class A bonded.

B. Required size is 3 inch nominal diameter.

2.04 Rail

A. Zinc galvanized steel pipe (galvanized at 1.8 oz per square foot), Schedule 40, vinyl coated black, class A bonded.

B. Required size is 1½ inch nominal diameter.

2.05 Chain Link Fabric

A. No. 9 gage steel wire zinc coated (coated at 1.8 oz per square foot). The gage requirement refers to the wire plus zinc coated diameter, and does not include any other coatings.

B. Wire to be vinyl coated black, class A bonded.

C. Top to be twisted and barbed, bottom to be knuckles.

D. Required mesh size is 2 inch.

E. Required height (measured from bottom of fabric to top of fabric) is 6 feet.

2.06 Tension Wire

A. No. 7 gage steel wire zinc galvanized (galvanized at 1.8 oz per square foot). The gage requirement refers to the wire plus zinc coated diameter, and does not include any other coatings.

B. Wire to be vinyl coated black, class A bonded.

2.07 Tie Wire

A. No. 9 gage steel wire zinc galvanized (galvanized at 1.8 oz per square foot). The gage requirement refers to the wire plus zinc coated diameter, and does not include any other coatings.

B. Wire to be vinyl coated black, class A bonded.

2.08 Gates

A. Provide swing gates as shown on the Drawings, hinged to swing total of 180 degrees so gate can swing in or out. Also provide latches, locking device, and gate stop keeper (cane bolt and cane bolt anchor base embedded in concrete).

B. All materials to match fencing materials identified above.

C. Height of gate to match height of fence.

2.09 Miscellaneous Hardware

Zinc coated commercial grade steel. Paint black, or as directed by OWNER.

PART 3 EXECUTION

3.01 Posts

Embed all posts in 3000 psi concrete bases. All posts to extend 3 feet minimum into concrete base. All concrete base diameters to be 12 inches, top of base to crowned 1 inch above grade, bottom of base to be 6 inches below bottom of post.

3.02 Fence Fabric, Wire, Rails, and Accessories

Install per FDOT requirements.

3.03 Gates

Provide cantilever gate as shown on the Drawings.

END OF SECTION

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SECTION 03300

CONCRETE

PART 1 GENERAL

1.01 Section Includes

General requirements for formwork, reinforcement, accessories and cast-in-place concrete.

1.02 References

A. American Concrete Institute (ACI) latest edition:

1. ACI 301 - Structural Concrete for Buildings
2. ACI 305 - Hot Weather Concreting
3. ACI 306 - Cold Weather Concreting
4. ACI 315 - Detailing Manual
5. ACI 318 - Building Code Requirements for Structural Concrete
6. ACI 347 - Formwork for Concrete

B. American Association of State Highway and Transportation Officials (AASHTO) latest edition:

AASHTO T152 - Air Content of Freshly Mixed Concrete by the Pressure Method

C. American Society for Testing and Materials (ASTM) latest edition:

1. ASTM A185 - Steel Welded Wire Fabric, Plain, for Reinforced Concrete
2. ASTM A615 - Deformed and Plain Billet Steel Bars
3. ASTM C31 - Making and Curing Concrete Test Specimens in the Field
4. ASTM C33 - Concrete Aggregates
5. ASTM C39 - Test Method for Compressive Strength
6. ASTM C94 - Ready-Mixed Concrete
7. ASTM C138 - Test Method for Unit Weight, Yield, and Air Content
8. ASTM C143 - Test Method for Slump of Hydraulic Cement Concrete
9. ASTM C150 - Portland Cement
10. ASTM C173 - Test Method for Air Content of Freshly Mixed Concrete (Volumetric Method)
11. ASTM C231 - Test Method for Air Content of Freshly Mixed Concrete (Pressure Method)
12. ASTM C260 - Air-Entraining Admixtures for Concrete
13. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete
14. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving

and Structural Construction

1.03 Submittals

A. Submit reinforcement steel shop drawings in accordance with Division 1, the General Conditions and prepared in accordance with ACI 315, Manual of Standard Practice for Detailing Reinforced Concrete Structures. Drawings shall indicate bending diagrams, shapes, dimensions, clearances, splicing and laps, accessories, and installation notes.

B. Submit manufacturer's literature for all admixtures proposed for the work.

C. Submit delivery tickets in accordance with ASTM C94 for each batch of ready-mixed concrete. Information on the ticket shall include class of concrete, water content, time of loading, truck number, admixtures, and quantity.

D. At least 35 days prior to placing of concrete, the CONTRACTOR shall submit proposed mix proportions and samples of proposed materials.

1.04 Quality Control

A. Materials and methods of mixing and placing concrete shall conform to ACI 318, Building Code Requirements for Reinforced Concrete.

B. Tests for slump shall be made when directed by the ENGINEER in accordance with ASTM C143.

C. Air content tests shall be made, when directed by the ENGINEER, in accordance with ASTM C138, C173, C231, or AASHTO T-152.

PART 2 PRODUCTS

2.01 Formwork

Formwork lumber shall be straight and clean. All nails shall be withdrawn and surfaces in contact with concrete shall be thoroughly cleaned before reuse.

2.02 Reinforcement

A. Reinforcement bars shall be ASTM A615, Grade 60 deformed bars, except as otherwise indicated.

B. Smooth dowels shall be ASTM A615, Grade 60 plain bars.

C. Threaded dowels shall be ASTM A36.

D. Welded wire fabric shall conform to ASTM A185. Where welded wire fabric is shown but not sized on Drawings, use 6" x 6" x W2.9 x W2.9 WWF.

E. Accessories for proper installation of reinforcement shall conform to CRSI "Manual of Standard Practice for Reinforced Concrete Construction". Bar supports at exposed surfaces shall be Class C-Plastic Protected.

F. Reinforcement fabrication shall conform to ACI 315 and ACI 318, and approved shop drawings.

2.03 Joint Fillers

A. Joint fillers shall be products of the following manufacturers, or equal:

1. W. R. Meadows, Inc., Elgin, Illinois.

2. W. R. Grace and Co., Cambridge, Massachusetts.

B. Preformed bituminous fiber joint filler shall be non-extruding type conforming to ASTM D1751.

C. Control joint strips shall have a minimum depth of 25 percent of slab thickness and a minimum thickness of 1/8 inch.

2.04 Concrete Materials

A. Water shall be clean and potable.

B. Portland cement shall be ASTM C150 Type I, II or III.

C. Aggregate

1. Fine and coarse aggregate shall be clean, hard, natural, or manufactured material conforming to ASTM C33.

2. The nominal maximum size of the aggregate shall not be larger than three-fourths of the minimum clear spacing between individual reinforcing bars. Coordinate with maximum aggregate sizes specified hereafter for classes of concrete.

D. Admixtures

Admixtures shall conform to ASTM C260 (air entrainment) or C494 (water reduction) and shall be products of one of the following manufacturers, or equal.

1. Dewey and Almy Chemical Div., W. R. Grace and Co.

2. Euclid Chemical Co.

3. Master Builders Co.

4. Sika Chemical Corp.

2.05 Miscellaneous Materials

A. Vapor barrier shall be polyethylene film 0.006 inches thick and shall conform to Product Standard PS-17.

B. Liquid Membrane Curing Compound

1. Membrane curing compound shall conform to ASTM C309, Type 1 or Type 2. Type 2 compound shall be used for Portland cement concrete pavement only. All permanently exposed exterior slabs shall receive clear acrylic curing and sealing compound. Moisture loss shall not be more than 0.055 gr./sq. cm when applied to 200 sq. ft./gal.

2. Products shall conform to the above and shall be products of one of the following manufacturers, or equal:

   a. W.R. Meadows "Curettard"
   b. Sonneborn-Contech "Sonsil"
   c. Burke Co. "Res-Xnu"
   d. Lambert Corp. "Gardseal"

C. Chemical Hardener

1. Colorless aqueous solution containing a blend of magnesium fluosilicate and zinc fluosilicate combined with a wetting agent, conforming to Federal Specifications TT-C-800A and Corps of Engineers Specification CE 204.

2. Products shall conform to the above and shall be products of one of the following manufacturers, or equal:

   a. Euclid Chemical Co. "Surfhard"
   b. Sonneborn-Contech "Lapidolith"
   c. Master Builders "Saniseal"
   d. Lambert Corp. "Solidus"

2.06 Concrete Mixtures

A. Concrete not indicated otherwise shall be Class A concrete.

B. Proportions of cement, aggregate, and water shall be selected by the CONTRACTOR in accordance with ACI 318 to provide a plastic and workable mix. Coarse aggregate shall be limited to prevent harshness and honeycombing. Coarse aggregate size shall not be greater than the maxima listed for the various classes of concrete and as previously specified under aggregate.

C. Class A Concrete: Class A structural concrete shall have a 28-day strength of 4000 psi, shall contain not less than 540 pounds (5-3/4 bags) of cement per cubic yard of concrete, shall have a water-cement ratio of not more than 0.47 (5-1/4 gallons per bag of cement), and shall contain 4 percent to 6 percent entrained air, by volume, except interior slabs subject to abrasion shall not contain more than 3 percent entrained air. In addition, Class A concrete shall contain a water-reducing, densifying admixture and have a maximum slump of 4 inches. The maximum aggregate size for slabs shall be 1 inch.

D. Class B Concrete: Class B lean concrete shall have a 28-day strength of 2500 psi, the concrete shall contain not less than 420 pounds (4-1/2 bags) of cement per cubic yard of concrete, shall have a water-cement ratio of not more than 0.71 (8 gallons per bag of cement), and shall have a 5-inch maximum slump. The maximum aggregate size shall be 2 inches.

E. Admixtures

1. Water-reducing densifying admixture added to Class A concrete shall reduce the water-cement ratio while maintaining slump and compressive strength. Use as manufacturer recommends.

2. Other admixtures may be proposed by the CONTRACTOR or requested by the ENGINEER and shall be provided at no additional cost to the OWNER. Subject to approval, admixtures may be used for the following:

    a. To increase slump up to 50% while maintaining compressive strength and water-cement ratio.

    b. To retard set during hot weather.

3. Calcium chloride, admixtures containing calcium chloride, or admixtures not approved, in writing by the ENGINEER, are prohibited.

PART 3 EXECUTION

3.01 General

A. Comply with ACI 305 or 306 for hot or cold weather concreting.

B. Do not mix salt, chemicals, or other foreign materials with the concrete to prevent freezing without approval of the ENGINEER. Maintain the temperature of concrete above 50 degrees F for 5 days after placement. When high early strength Portland cement concrete is used, the temperature shall not be less than 70 degrees F for 2 days or 50 degrees F for 3 days.

C. In no case shall the temperature of concrete exceed 90 degrees F at the time of placement.

3.02 Preparations

A. Coordinate with other trades and properly place and locate in position all necessary dowels, bolts, anchors, anchor slots, inserts, sleeves, openings, hangers, metal ties and other fastening devices required for attachment and support of adjacent work. Securely anchor all embedded items.

B. Subgrade and/or bedding shall be compacted and free of frost. If placement is allowed at temperatures below freezing, provide temporary heat and protection as required to remove all frost. Saturate the subgrade approximately 8 hours before placement and sprinkle ahead of the placement of concrete in areas where vapor barrier is not used. Remove all standing water, ice, mud, and foreign matter before concrete is deposited.

C. On porous subgrade or beddings, or where indicated on the Drawings, provide vapor barrier. Lay vapor barrier sheets with 6-inch edge laps and tape or seal with mastic. Stretch and weight edges and laps to maintain their positions until concrete is placed. Coordinate with placement of reinforcement.

3.03 Formwork Requirements

A. Formwork shall comply with ACI 347 and to shape, lines and dimensions as indicated on the Drawings. Forms shall be properly braced or tied to maintain position and shape under all dead and live loads and to prevent leakage. Forms shall be assembled so their removal will not damage the concrete. Tolerances for formed surfaces shall be in compliance with ACI 301.

B. Lumber formwork may be used for surfaces which will not be exposed to view. Use plywood or metal forms for exposed surfaces.

C. Inside surface of lumber forms shall be soaked with clean water prior to placing

concrete. All other forms shall be treated with an approved form oil or lacquer. If oil is used, all excess oil shall be wiped off.

3.04 Reinforcement

A. Placement of reinforcing steel shall conform to "Placing Reinforcing Bars", as published by the Concrete Reinforcing Steel Institute except as noted.

B. Reinforcement shall be inspected and approved by the ENGINEER before enclosing forms are erected and shall be rechecked immediately prior to depositing concrete.

C. Splices, Laps, and Dowels

1. Provide continuous reinforcement or dowels through construction joints. One half of reinforcement shall be discontinued across control joints unless otherwise indicated. All reinforcement shall be discontinued across expansion joints.

2. Splice laps shall be as indicated on the Drawings. Dowels shall be of the same size as the largest bar to which they lap, unless otherwise indicated.

3. Splices for horizontal wall reinforcement of circular tanks shall be staggered so that no more than each fifth bar in each face is spliced within any two feet of wall perimeter. Slab reinforcement splices for circular tanks shall be staggered as indicated on the Drawings. The minimum length of staggered lap splices in circular structures shall be as indicated on the Drawings.

D. Fabric Reinforcement for Slabs

1. Fabric reinforcement for slabs shall be overlapped at splices not less than the spacing of the cross wires plus 2 inches. Fabric shall extend to within 4 inches of concrete edges.

2. Unless otherwise shown, place reinforcement 2 to 3 inches below the top of the finished slab. Mesh shall either be sandwiched between two layers of fresh concrete or supported on mesh supports. Supports that may puncture the vapor barrier, if any, shall not be used.

E. Reinforcement for Formed Concrete

Secure steel reinforcement to maintain proper position during concrete placement. Concrete protection for reinforcement shall conform to ACI 318, except as otherwise indicated on the Drawings. The distance from the center of reinforcing bars to the opposite face of all structural slabs, walls, columns, or beams shall conform to ACI 318. The distance may be increased provided the required cover is maintained.

3.05 Joints

A. Provide construction joints with shear transfer keyways as indicated.

B. Tops of edge forms and screeds shall be set to the finished elevations and to provide uniform pitch to drains as indicated on the Drawings.

C. For drives, pavements, parking areas, walks and slabs on grade, provide preformed non-extruding asphalt strip or bituminous fiber joint filler set 1/8-inch below finished surface unless otherwise indicated. Tool concrete edges on each side of joint. No sealant is required.

3.06 Batching

A. Materials for concrete shall be proportioned and batched according to the approved design mix.

B. Water shall be measured to within 1 pint of the total amount required per batch. Admixtures shall be measured by weight or volume to an accuracy of 3 percent.

3.07 Mixing and Transporting Concrete

A. Concrete shall be ready-mixed or job-mixed at the CONTRACTOR's option. Ready-mixed concrete shall be mixed and delivered to the project in accordance with ASTM C94. Job-mixed concrete shall be in accordance with the requirements of ACI 318.

B. Concrete shall be in its final position within one hour after the water and aggregate have been added to the cement, except in cool weather (50`F or less).

C. Concrete shall be transported from the mixer to place of final deposit in such manner to prevent separation or loss of ingredients.

3.08 General Concrete Placement Schedule

All structural concrete.....	Class A Concrete
Sidewalks	Class B Concrete

3.09 Depositing Concrete

A. Concrete shall be placed in accordance with the requirements of ACI 318 and within 10 feet of its final position. Place concrete only during normal working hours unless the ENGINEER is notified at least 24 hours in advance. Concrete shall not be placed until the ENGINEER has approved the formwork, reinforcement, and embedded items and debris has been removed.

B. Whenever new concrete is to be placed against existing surfaces, roughen and clean the surface to improve bond.

C. Depositing Slabs and Flatwork

1. Provide runways and chutes to discharge concrete close to final position to minimize spreading and segregation.

2. Place slabs-on-grade using formed construction joints. Maximum size of pour shall be 40 feet each way for slabs with wire mesh reinforcement and 75 feet each way for slabs with bar reinforcement. Allow 24 hours between pours of adjacent slabs. Provide joints as specified or shown. Set continuous joint strips between slabs and abutting vertical surfaces as indicated on the Drawings.

3.10 Finishing Slabs and Flatwork

A. Unless otherwise indicated, provide the following slab finishes:

Description	**Concrete Finish**
Class B concrete surfaces	Float
Submerged slabs	1 troweling
Exposed slabs	3 trowelings
Ramps and walks	Float & broom finish

B. Concrete Tolerances

1. Concrete shall be within ¼-inch of a 10-foot straightedge in all directions except where slabs are dished for drains. Deviations from the elevation indicated shall not exceed ¼-inch.

2. Slabs sloped for drainage shall not have depressions which retain water.

C. Screeding

1. Immediately after placement, screed concrete with straightedges or power strikeoffs. Do not use roller screeds or vibrating screeds.

2. Stakes for wet screeds shall be driven down flush with subgrade or pulled out as work progresses to avoid disturbing screeded concrete.

3. For drains in level slabs, form a 5-foot diameter depression approximately ½-inch below the adjacent slab surface.

4. Unless otherwise indicated on the Drawings, slabs sloped for drainage shall be uniformly pitched toward the drains at 1/8-inch per foot. Form a dished depression at drains unless otherwise indicated.

D. Immediately after screeding, darby surface with wood or magnesium darby to eliminate ridges and to fill in voids left by screeding.

E. Float Finish

1. Float concrete using magnesium or aluminum hand floats or power floats after the concrete has stiffened to a point where only a ¼-inch indentation can be imparted by normal foot pressure.

2. Float finish shall result in a uniform, smooth, granular texture. After floating, check slab tolerances with 10-foot straightedge. Fill low spots with fresh concrete; do not sprinkle with dry cement.

F. Trowel Finish

1. Where scheduled, or indicated, trowel with steel trowels after floating.

2. Initial troweling shall be done either by power or by hand with the trowel blade kept as flat as possible against concrete surface to prevent washboard or chatter effect.

3. Second troweling may be done by power if three trowelings are scheduled. If two trowelings are specified, second troweling shall be done by hand.

4. Third troweling shall be done by hand and shall continue until the concrete is consolidated to a uniform, smooth, dense surface free of trowel marks and irregularities.

5. Allow sufficient time between successive trowelings to allow the concrete to become harder. Each successive troweling shall be done with trowels that are progressively smaller and are tipped more to increase compaction of the concrete surface.

G. Broom at right angles to direction of traffic to give a non-skid finish. Use a fine, soft-bristled broom for pedestrian ramps and walks, and a coarse, hard-bristled broom for vehicular pavement.

3.11 Control Joints

A. Control joints for non-structural slabs shall consist of partial depth plastic strips set flush with finished surface or 1/8-inch wide joints cut with a diamond saw. Control joints shall be one-quarter to one-third the depth of the slab unless otherwise indicated.

B. Saw joints as soon as concrete has hardened sufficiently so aggregate will not be

dislodged but before shrinkage stresses develop cracks. Sawn joints shall be filled with joint sealant in accordance with Section 07900.

C. Unless otherwise indicated on the Drawings, spacing of control joints shall not exceed 25 feet in each direction.

3.12 Protection and Curing

A. Comply with ACI 305 and 306 for protecting and curing concrete in hot and cold weather. Fresh concrete shall be protected from rain, premature drying and excessively hot or cold temperatures, and shall be maintained with minimal moisture loss for the period of time necessary for the hydration of the cement and proper hardening of the concrete. Cure all concrete for a minimum period of 7 days (3 days for high early strength concrete) after placing.

B. Flatwork

1. Immediately after finishing, begin curing by covering with constantly saturated moisture retaining fabrics, impervious sheeting, or membrane curing compounds. Surfaces shall be thoroughly wetted with a fine spray before they are covered with sheeting.

2. Sheeting shall provide complete surface coverage with all joints lapped at least 4 inches and shall be placed and secured in a manner that will not mar or damage the concrete surface.

C. Membrane Curing Compounds

1. Apply compound hereinbefore specified in accordance with manufacturer's recommendations. Apply by spraying in a two-coat continuous operation. Apply the coats at right angles to each other with a coverage of 200 square feet per gallon per coat. Begin application not later than 4 hours after finishing of the surface. The application shall result in an uninterrupted adherent film free of defects.

2. On surfaces scheduled to receive sealants, paint, seamless flooring, or other adhesive bonded finishes, either the membrane curing compound shall be compatible with the bonding agent or the curing compound shall be removed with sandblasting, acid etching or grinding, to the satisfaction of the installer of the finish surfacing. Bonded surfaces that fail to adhere to the concrete shall be removed and replaced at no additional cost to the OWNER

D. Concrete Floor Hardener

1. Apply hardener to floors of mechanical and electrical rooms and in other areas as required. Application shall be in strict accordance with the

manufacturer's recommendations and as follows:

a. Hardener shall be applied at original container consistency without dilution to dry, clean surfaces no sooner than 30 days following completion of curing. NOTE: Hardener shall not be applied over surfaces covered with membrane curing agent.

b. Application shall generally be a three-coat process adjusted to accommodate extreme concrete densities only if prior review has been obtained from the Architect. Application coverage shall be made at the approximate rate of one gallon to 100 square feet.

c. Apply first and second coats generously to surface, mop or squeegee standing water to leave a uniformly wet surface, allow to dry. Apply third coat in a manner similar to first two, except that surplus must be scrubbed with stiff bristled broom and flushed from floor surface with clear water. Scrubbing and flushing shall remove all traces of effervescence. Remove excess water and allow to dry.

3.13 Defective Concrete

A. All concrete not formed as indicated on the Drawings within tolerances specified in ACI 347 shall be removed and replaced.

B. Temperature and shrinkage cracks which develop prior to final acceptance of the work shall be repaired.

3.14 Miscellaneous Concrete Work

Provide concrete equipment pads and supports as indicated and conforming to approved shop drawings. Fastening devices and accessories shall be located by templates or setting diagrams furnished by the manufacturer.

3.15 Clean-Up

A. All concrete floor construction shall have the surfaces thoroughly scrubbed and cleaned with clear water. After cleaning, the floors shall be protected until they are accepted.

B. Clean all surfaces affected by the Concrete Work. No extraneous concrete or discoloration shall be left on any construction.

3.16 Concrete Testing

A. Compressive Strength Tests: Conform to ASTM C31 and ASTM C39. One set of four cylinders for each 50 cu. yds., or fraction thereof, of each strength concrete

placed in any one day. Test one specimens at seven days; test two specimens at 28 days. One specimen shall be retained for 56 days and tested only at the direction of the ENGINEER.

B. Slump Tests: Conform to ASTM C143. Perform one test for each load point of discharge and one for each set of compressive strength test specimens.

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SECTION 09871

INTERIOR PROTECTIVE LINING FOR CONCRETE STRUCTURES

PART 1 - GENERAL

1.01 SCOPE OF WORK

This specification covers all work, materials and equipment required for protecting concrete and masonry underground structures by application of either a monolithic high-build epoxy coating or a multi-component stress panel liner, to provide corrosion protection and enhance structural integrity of the existing manhole and pump station wet well. Procedures for surface preparation, cleaning, application and testing are described herein. The CONTRACTOR shall furnish all labor, tools, materials, equipment, and incidentals required to prepare existing concrete surface, repair concrete and provide corrosion resistant protective linings for the interior surfaces of the pump station wet well including walls, ceiling, floor, piping, pipe supports, and or all exposed concrete or masonry surfaces.

1.02 SUBMITTALS

A. CONTRACTOR shall submit shop drawings to the OWNER for review and approval prior to initiating work.

B. The following items shall be submitted:

1. Technical data sheet on each product used, including ASTM test results indicating the product conforms to and is suitable for its intended use per these specifications.

2. Material Safety Data Sheets (MSDS) for each product used.

3. Project specific guidelines and recommendations for surface preparation and lining application.

4. Qualification of Installer/Applicator

a. Manufacturer certification that Applicator has been trained and approved in the handling, mixing and application of the products to be used. CONTRACTOR shall submit a written affidavit from the manufacturer of the lining stating that the individuals applying the coatings are sufficiently skilled in the application of their product.

b. Certification that the equipment to be used for applying or installing the products has been manufactured or approved by the protective coating manufacturer and Applicator personnel have been trained and

certified for proper use of the equipment.

c. Proof of any necessary federal, state or local permits or licenses necessary for the project.

5. Design details for any additional ancillary systems and equipment to be used in site and surface preparation, application and testing.

6. Provide documentation that the proposed liner(s) has a history for use in similar applications.

1.03 QUALITY ASSURANCE

A. HDPE Liner Installer Qualification and Experience

1. Fabricator/Installer shall have a current certification and acknowledgement that they have been approved by the liner manufacturer as a qualified installer for both cast-in-place new construction procedures and rehabilitative procedures for existing structures. The fabricator/installer shall also have a minimum of five (5) years commercial experience with Orange County in the installation of the HDPE liner material for both cast-in-place and rehabilitation installation methods and procedures within a water/wastewater structure application. Verification of the experience and certification shall be submitted in writing, and shall only be verified by the liner manufacturer and not by any agent, distributor, representative or sales person.

2. Fabricator/Installer's jobsite foreman or superintendent, being responsible for the installation of the liner system, shall have a minimum of three (3) years commercial experience in the installation and fabrication of HDPE liner material. In addition he or she shall have a minimum of three (3) years commercial experience in HDPE field welding procedures as defined herein. The welding experience shall be documented by current and past welding certificates to verify this requirement.

B. Installer/Applicator shall initiate and enforce quality control procedures consistent with applicable ASTM, NACE and SSPC standards, the protective coating manufacturer's recommendations and these specifications.

C. A protective coating manufacturer's representative shall provide on-site observation and site specific recommendations relative to surface preparation, handling, application and curing of its products. In addition, the manufacturer shall provide written certification that Applicator has been trained and certified by the manufacturer to handle and apply their products.

D. A protective coating manufacturer's representative shall provide on-site inspection of the prepared surfaces prior to installation of the liner. Manufacturer's representative

shall provide the OWNER written demonstration that the surface has been properly prepared and surface is ready to receive protective lining.

1.04 DELIVERY, STORAGE, AND HANDLING

A. Materials are to be kept dry, protected from weather and stored under cover.

B. Protective coating materials are to be stored between 50º F and 90º F. Do not store near flame, heat or strong oxidants.

C. Protective coating materials are to be handled according to their material safety data sheets and manufacturer's recommendations.

1.05 SITE CONDITIONS AND COORDINATION WITH OTHER WORK

A. Installer/Applicator shall conform to all local, state and federal regulations including those set forth by OSHA, RCRA and the EPA and any other applicable authorities.

B. Method statements and design procedures are to be provided to OWNER for approval when confined space entry requirements are required for Installer/Applicator to perform the specified work.

C. Following completion of all wet well work the Installer/Applicator shall inspect the condition of the lining and repair and or install the lining on any surfaces or materials which have been added, damaged or disturbed. The finished wet well shall be re-inspected in accordance with specifications herein.

1.06 WARRANTY

Installer/Applicator shall warrant all work against defects in materials and workmanship for a period of ten (10) years, unless otherwise noted, from the date of final acceptance of the project. Installer/Applicator shall, within a reasonable time after receipt of written notice thereof, repair defects in materials or workmanship which may develop during said ten (10) year period, and any damage to other work caused by such defects or the repairing of same, at his own expense and without cost to the OWNER.

1.07 REFERENCES

A. ASTM D638 - Tensile Properties of Plastics

B. ASTM D790 - Flexural Properties of Unreinforced and Reinforced Plastics

C. ASTM D695 - Compressive Properties of Rigid Plastics

D. ASTM D4541 - Pull-off Strength of Coatings Using a Portable Adhesion Tester

E. ASTM D2584 - Volatile Matter Content

F. ASTM D2240 - Durometer Hardness, Type D

G. ASTM D543 - Resistance of Plastics to Chemical Reagents

H. ASTM C109 - Compressive Strength Hydraulic Cement Mortars

I. ASTM C348 - Flexural Strength Hydraulic Cement Mortars

J. ASTM C396 - Compressive Strength of Cement Mortars

K. ACI 506.2-77 - Specifications for Materials, Proportioning, and Application of Shotcrete

L. ASTM C579 - Compressive Strength of Chemically Setting Silicate and Silica Chemical Resistant Mortars

M. ASTM - The published standards of the American Society for Testing and Materials, West Conshohocken, PA

N. NACE - The published standards of National Association of Corrosion Engineers (NACE International), Houston, TX

O. SSPC - The published standards of the Steel Structures Painting Council, Pittsburgh, PA

1.08 ACCEPTABLE APPLICATORS

A. An applied protective coating must be applied by a Certified Applicator of the protective coating manufacturer and according to manufacturer specifications.

B. Cast-in-place liners shall be installed in accordance with manufacturer's recommendations and approved procedures.

PART 2 - PRODUCTS

2.01 GENERAL

A. All interior surfaces of the pump station wet well shall be lined with a corrosion-resistant lining. Note that this includes the floors, walls, ceilings, support beams, piping, and any other concrete and metal surfaces within the specified areas. The lining shall be designed specifically for protection of concrete and or metal from the corrosive environment normally found in wastewater pumping station wet wells.

B. Lining shall be fully resistant to a wide variety of acids, alkalis, grease, and oils.

C. Liner shall be free of pores, pinholes, voids and foreign bodies.

D. Liner shall be flexible and have elongation qualities capable of bridging up to a ¼ inch settling or expansion crack without affecting the performance of the liner.

2.02 PROTECTIVE COATING MATERIAL

Type of lining to be installed in the pump station shall be an approved manufacturer as listed in the latest edition of Appendix D from the Orange County Manual of Standards and Specification for Water and Wastewater Construction.

2.03 PROTECTIVE COATING APPLICATION EQUIPMENT

If using a spray type of coating, the CONTRACTOR shall use equipment specifically designed, or approved for use by the protective coating manufacturer, for use in the application of the specified protective coating.

2.04 HDPE LINER MATERIAL

A. Design

1. Liner shall be HDPE (high density polyethylene) with a minimum thickness of 3 mm. All HDPE liner sheets shall be extruded with a large number of anchoring studs, a minimum of (39/ft²), manufactured during the extrusion process in one piece with the sheet so there is no welding and no mechanical finishing work to attach the studs to the sheet. The liner shall have a minimum pull out of 112.5 lbs. /anchoring stud.

2. Flat liner sheet, non-anchored, shall be used for overlapping joints, and shall have a minimum thickness of 3mm. All joints shall be sealed by means of thermal welding performed by the approved liner manufacturer and currently certified welders.

3. Smooth polyester back sheet liner shall be HDPE (high-density polyethylene) with a minimum thickness of 3mm. The manufacturer shall install polyester fabric during the extrusion process.

4. Lining shall have good impact resistance, shall be flexible, and shall have an elongation sufficient to bridge up to a 1/4" setting crack, without damage to the lining. Liner shall be able to bridge any expansion cracks that may occur.

5. A liner manufacturer approved and current certified fabricator/installer would custom fit the liner to the formwork or installation apparatus in order to protect the concrete surfaces from sewer gases. The interior surfaces to be

protected shall include the walls, ceiling, floors and pipe entries.

6. For all lined manholes the use of HDPE Grade rings shall be used in lieu of brick or precast grade ring. Grade ring shall meet HS-25 load rating. Butyl sealant shall be used between each ring to make a watertight joint. The first grade ring will be welded to the liner to provide a gas tight seal.

7. Installed HDPE liner shall be repairable at any time during the life of the system.

8. Transitions from dissimilar materials, such as PVC pipe to HDPE liner, shall be accomplished using a polyester backed HDPE liner transition wrap and an approved bonding material. The polyester fabric shall be attached to the liner during the manufacturer's extrusion process.

B. Physical Properties

1. The HDPE liner systems and welding rod shall be manufactured from the same resins and meet the following properties:

Property	Testing Method	Unit	HDPE
Density	ASTM D792-86	g/cm³	0.0945
MFI (Melt Flow Index)	ASTM D1238-88	g/10min	(190/5)
Heat Reversion (Dimensional Stability)	ASTM D1638-83	%	<2
Yield Stress	ASTM D638-89	PSI	≥2,320
Elongation of Yield	ASTM D638-89	%	≥12
Elongation at Break	ASTM D638-89	%	≥200
Fire Classification	UL-94		V2
Maximum Working Temperature		°C °F	60 140

2. Upon request, the manufacturer shall provide written certification that the liner used meets or exceeds the requirement of this specification.

PART 3 - EXECUTION

3.01 SURFACE PREPARATION FOR LINER MATERIALS THAT ARE APPLIED FOLLOWING CONSTRUCTION

A. Applicator and lining manufacturer's representative shall inspect all surfaces specified to receive a protective coating prior to surface preparation. Applicator shall notify OWNER of any noticeable disparity in the surfaces, which may interfere with the proper preparation, or application of the protective coating.

B. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.

C. Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the protective coating to be applied.

D. All surfaces shall be repaired as required by the manufacturer of the protective coating system. The Applicator shall be responsible for selecting the proper material, means and methods for complying with the manufacturer's recommendations. Prior to initiating work, the Applicator shall submit a copy of the manufacturer's recommendations and the Applicator's proposed materials and procedures to the OWNER for review.

E. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with uniform, adequate profile and porosity to provide a strong bond between the protective coating and the substrate. Generally, this can be achieved with high-pressure water cleaning using equipment capable of 5,000 psi at 4 gpm. Other methods such as high-pressure water jetting (refer to NACE Standard No. 5/SSPC-SP12), abrasive blasting, shotblasting, grinding, scarifying or acid etching may also be used. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. The Applicator shall be responsible for selecting the method or combination of methods needed to adequately prepare the surface for receiving the selected lining system. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface that is not excessively damaged.

F. Infiltration shall be completely stopped by means of urethane or chemical grout methods as best elected by the applicator.

G. Test prepared surfaces after cleaning but prior to application of the coating materials to determine if a specific pH or moisture content of the concrete has been achieved in accordance with the manufacturer's recommendations. Concrete surfaces tested for pH shall achieve a pH reading of 9 or higher prior to the application of the lining material.

H. Following abrasive blasting, all blasting material and debris shall be completely removed from the wet well area. All surfaces shall be water washed as needed to remove residual dust, debris, or other blasting materials which could inhibit proper bonding of either the repair material or lining system.

I. All surfaces should be inspected by the OWNER's Inspector during and after preparation and before the repair mortar is applied. Manufacturer's representative for the repair mortar shall inspect the surface and shall certify in writing that the surface has been adequately prepared to receive their product.

J. Prior to the installation of the liner all surfaces shall receive a wire mesh material if the grout base is in excess of three (3) inches in thickness. The wire mesh shall be supported by Type 304 Stainless Steel anchors sufficient to support the liner and grout installation. The anchors shall be placed on two (2) foot center grids throughout the structure or in any area liner is to be installed.

3.02 INSTALLATION OF CAST-IN-PLACE LINER SYSTEM

A. If the liner installer is a subcontractor to the Contractor responsible for casting the lined structure in place, the Contractor must consult and coordinate with the liner installer as to work sequencing, schedule, set-up, type of forming system to be used, and other requirements necessary to assure that the liner system is successfully installed.

B. Fabrication and installation of the HDPE liner system, and the Thermo-extrusion welding of the liner, shall be accomplished only by personnel certified by the liner manufacturer.

C. New HDPE liner system installed shall be constructed with a minimum overall inside dimension three (3) inches less than the original inside dimension of the structure to be rehabilitated. The resulting void will be placed with high-strength grout. The grout used to anchor the liner shall be Type II Portland grout producing an average 6,500 psi compressive strength in 28 days. Grout shall be placed or pumped in place and vibrated to eliminate voids. The installation system used to install the liner during the grout placement shall be capable of supporting the liner material against the grout placement and would result in a finished newly lined surface. Vibrating of the liner material and grout shall be accomplished until the grout has consolidated around all liner material anchors to achieve a final set.

D. Smooth liner, polyester back liner shall be installed only in areas resulting in no back pressure from the existing structure i.e. above grade only applications. The liner sections shall be cut to fit the specified area then dry-fit to verify the size and joining. A two-part style epoxy shall be applied to existing substrate to be lined. The liner shall be installed over the epoxy surface then compressed with a J-style roller, from the center to the most outer edges of the liner sheet to eliminate any air pockets to

assure an adequate bond. After installation of the liner on the epoxy surface, the liner shall be anchored in place by use of Powers-Rawl 304 SS 3/16" x 1" Mushroom Head Spike. Each spike installed shall be welded to the liner material to create a finished bottom. The remaining vertical and horizontal joints shall be welded in accordance with the specifications contained herein.

E. All welding shall be performed in accordance with the published directives and procedures of the manufacturer and by welders certified by the manufacturer. Completion of welding will provide a one piece monolithic concrete protective liner system that will provide excellent resistance to hydrogen sulfide attack and will not pull off the wall.

F. The following welding techniques are acceptable:

1. Extrusion welding

2. Butt welding

3. Hot air welding

G. Spark testing of the installed liner will be performed by the liner installer in the presence of the OWNER's representative.

H. All work shall be supervised and performed by confined space trained and certified personnel. All work shall conform to OSHA safety guidelines.

3.03 APPLICATION OF APPLIED LINER MATERIAL

A. Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment. All linings shall be applied in strict accordance with the manufacturer's recommendations. Non-uniformity, sagging, delamination, holidays, bubbles or other defects will be cause for rejection of the lining.

B. Spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order throughout the application period.

C. Protective coating material must be applied by a Certified Applicator of the protective coating manufacturer as specified herein.

D. For the Epoxy liner system, the specified surfaces shall be coated by spray application of a moisture-tolerant, 100% solids, self-priming epoxy protective coating as further described herein. Spray application will be allowed to minimum and average wet film thickness of 60 and 150 mils, respectively.

E. Airless spray application equipment approved by the coating manufacturer shall be used to apply each coat of the Protective lining to avoid any potential contamination from compressed air oil, which may encourage inter-coat delamination. Air assisted spray application equipment may be acceptable, especially for thinner coats (<10 mils), only if the air source is filtered to completely remove all oil and water.

F. If necessary, subsequent topcoating or additional coats of the protective lining should occur as soon as the base coat becomes tack free, ideally within 12 hours but no later than 24 hours after the prior coat has been applied unless additional surface preparation is performed. The Protective coating manufacturer must be consulted for any additional-coat surface preparation guidelines, if necessary, and shall provide written instructions detailing the proper procedures for applying subsequent coats of the lining material.

G. (Optional for Epoxy Liner Material) Fiberglass woven-roving fabric may be rolled into the resin or chopped glass spray applied with the resin for added tensile and flexural strength where desired. Sloped surfaces of the floor may be made non-skid by broadcasting aluminum oxide or silica sand into the surface prior to gelation.

H. CONTRACTOR shall furnish a written affidavit from the lining manufacturer stating that the finished lining has been inspected by a factory representative and that the lining system has been installed in accordance with the manufacturer's recommendations.

3.04 TESTING AND INSPECTION OF APPLIED LINER MATERIAL

A. During application, a wet film thickness gage, such as those available through Paul N. Gardner Company, Inc. meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness.

B. After the protective coating has set hard to the touch, coating shall be inspected with high-voltage holiday detection equipment. An induced holiday shall be made on to the coated concrete surface and shall serve to determine the minimum/maximum voltage to be used to test the coating for holidays at that particular area. The spark tester shall be initially set at 100 volts per 1 mil (25 microns) of film thickness applied but may be adjusted as necessary to detect the induced holiday. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper or other hand tooling method. After abrading and cleaning, additional protective coating material can be hand applied to the repair area. All touch-up/repair procedures shall follow the protective coating manufacturer's recommendations.

C. Measurement of bond strength of the protective coating to the substrate can be measured in accordance with ASTM D4541. The Project Engineer shall evaluate

any areas detected to have inadequate bond strength. Further bond tests may be performed in that area to determine the extent of potentially deficient bonded area and repairs shall be made by Applicator in strict accordance with manufacturer's recommendations.

D. A final visual inspection shall be made by the OWNER's Inspector and manufacturer's representative. Any deficiencies in the finished coating shall be marked and repaired by Applicator according to the procedures set forth herein.

3.05 TESTING AND INSPECTION OF CAST-IN-PLACE LINER

A. Resultant concrete structure surfaces shall be leak-free, smooth and free of honeycomb or areas of segregated aggregate. The HDPE liner shall be securely embedded into its surface to produce a continuous protective barrier. At the OWNER's direction, a 4-inch diameter coupon may be made in the HDPE between the anchors to expose the new concrete interior and verify its condition and then sealed by welding.

B. Surface and welds shall be tested at minimum 10,000 volts with a holiday detector for pinholes and holidays. Any defect shall be promptly repaired and re-tested.

C. Inspection and testing shall be performed by the certified applicator in the presence of the OWNER.

3.06 TESTING AND INSPECTION OF MECHANICALLY FASTENED LINER

A. Resultant concrete structure surfaces shall be leak-free, smooth, and free of any cuts, open seams or defects. The HDPE liner shall be securely anchored into its surface to produce a continuous protective barrier. At the OWNERs direction, a 4-inch diameter coupon may be made in the HDPE between the anchors to expose the existing concrete interior and verify its adhesion and then sealed by welding.

B. Surface and welds shall be tested at minimum 10,000 volts with a holiday detector for pinholes and holidays. Any defects shall be promptly repaired and re-tested.

C. Inspection and testing shall be performed by the certified applicator in the presence of the OWNER.

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APPENDIX 1

ORANGE COUNTY UTILITIES STANDARDS AND CONSTRUCTION SPECIFICATIONS MANUAL, APPENDIX D – LIST OF APPROVED PRODUCTS

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APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Air Release	ARV Enclosure	**All ARV above ground enclosures shall be vented with tamper proof locking device**						
		Water Plus Polyethylene Enclosure	131632 H30-B	Blue 44" Tall	131632 H30-P	Pantone 44"	131632 H30-G	Green 44" Tall
			171730 H40-B	Blue 30" Tall	171730 H40-P	Pantone 30"	171730 H40-G	Green 30" Tall
		Hot Box Vent Guard Fiberglass Enclosure	AVG2036 Encl GP3232 Base	Blue 36" Tall	AVG2036 Encl GP3232 Base	Pantone 36" Tall	AVG2036 Encl GP3232 Base	Green 36" Tall
			AVG2041 Encl GP3232 Base	Blue 41" Tall	AVG2041 Encl GP3232 Base	Pantone 41" Tall	AVG2041 Encl GP3232 Base	Green 41" Tall
		Safety-Guard/Hydro Guard	15100 Encl	Blue 34" Tall	15100 Encl	Pantone 34" Tall	15100 Encl	Green 34" Tall
	Air Release Valves	**Air Release Valves shall be Combination Type, 316 SS**						
		ARI	D-040SS	Combination	D-040SS	Combination	D-020 (SS)	Combination
		H-TEC	NA	NA	NA	NA	986 (316SS)	Combination
		Vent-O-Mat	Series RBX DN50	2"	Series RBX DN50	2"	RGX series	
	ARV Vault	**Air Release Valve Frame and Cover**						
		US Foundry	NA	NA	NA	NA	USF 7665-HH-HJ	
Blow Off	Auto Blow Off	**Automatic Blow Off Valve**						
		Hydro Guard	HG-1 Standard Unit	Automatic	NA	NA	NA	NA
	Blow Off Valve	**Blow Off Valve - Fits standard 5-1/4 inch Valve Box**						
		Kupferle Foundry Co	Truflo Series TF #550		Truflo Series TF #550		NA	NA
		Water Plus Corp	The Hydrant Plus Series VB 2000B		The Hydrant Plus Series VB 2000B		NA	NA
Casing Seals / Spacers	Casing End Seals	**Casing End Seals. Annular space between pipe and steel casing shall be brick and mortar with end seals to secure ends.**						
		Advance Products	Model AC and AW		Model AC and AW		Model AC and AW	
		BWM Company	Model WR and PO		Model WR and PO		Model WR and PO	
		Cascade Water Works	Model CCES		Model CCES		Model CCES	
		CCI Pipeline	Model ESW and ESC		Model ESW and ESC		Model ESW and ESC	
		Pipeline Seal & Insulator, Inc (PSI)	Model C and W		Model C and W		Model C and W	
		Power Seal	Model 4810ES		Model 4810ES		Model 4810ES	

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Casing Seals / Spacers	Casing spacer	**Casing spacers shall be a min. 8-inches wide for pipe 12" Dia or less or min. 12-inches wide for pipe 16 or greater , shall have a minimum 14 gauge 304 stainless steel shell/band, minimum 10 gauge 304 reinforced risers; minimum thickness of 0.090 EPDM or PVC interior liners, glass reinforces polymer or ultra high molecular weight polyethylene and 304 stainless bolts, nuts and washers.**						
		Advance Products	SSI8 / SSI12		SSI8 / SSI12		SSI8 / SSI12	
		BWM Company	BWM-SS-8 / SS-12		BWM-SS-8 / SS-12		BWM-SS-8 / SS-12	
		Cascade Water Works	Series CCS 8" / 12"		Series CCS 8" / 12"		Series CCS 8" / 12"	
		CCI Pipeline	Model CCS8 / CSS12		Model CCS8 / CSS12		Model CCS8 / CSS12	
		Pipeline Seal & Insulator, Inc (PSI)	Series S8G-2 / S12G-2		Series S8G-2 / S12G-2		Series S8G-2 / S12G-2	
Coatings	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenances - System 1 Zinc / Urethane / Fluoropolymer application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**						
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carbothane 133 HB	3.0 -5.0 mils	Carbothane 133 HB	3.0 -5.0 mils	Carbothane 133 HB	3.0 -5.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
			Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils
	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenances - System 2 Zinc / Epoxy / Urethane application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**						
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carboguard 60	4.0 -6.0 mils	Carboguard 60	4.0 -6.0 mils	Carboguard 60	4.0 -6.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
		PPG / Ameron	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils
			Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils
			Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Fittings	Fittings	**Ductile Iron Fittings C153 SSB / C110 FLG: (Water & Reclaimed Water fittings shall cement lined or holiday free fusion bonded epoxy lined) (Wastewater fittings interior shall be Protecto 401 and holiday free)**						
		American	30" & up	FBE / Cement	30" & up	FBE / Cement	30" & up	Protecto 401
		Sigma		FBE / Cement		FBE / Cement		Protecto 401
		Star		FBE / Cement		FBE / Cement		Protecto 401
		Tyler Union & Clow		FBE / Cement		FBE / Cement		Protecto 401
Flow	Flow Meter	**Flow Meters With Replaceable Sensors**						
		EMCO	NA	NA	NA	NA	Unimag 4411E	
Hydrants	Hydrants	**Hydrants Shall open left, 1-1/2 Pentagon operating nut, NST hose & pumper thread, rotate 360 degrees, closed drains, epoxy on shoe in & out and 304 SS nuts & bolts below ground.**						
		American Flow Control	B-84-B (6 inch)		NA	NA	NA	NA
		Clow	Medallion 2545		NA	NA	NA	NA
		Mueller	Super Centurion 250		NA	NA	NA	NA
Joint Restraints	Ductile iron pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain ductile iron pipe to mechanical joint fittings, pipe and appurtenances.**						
		EBAA Iron Inc	Megalug Series 1100		Megalug Series 1100		Megalug Series 1100	
		Ford / Uni-Flange	UFR-1400		UFR-1400		UFR-1400	
		Sigma	OneLok Series SLD/SLDE		OneLok Series SLD/SLDE		OneLok Series SLD/SLDE	
		Smith Blair	Cam Lok Series 111		Cam Lok Series 111		Cam Lok Series 111	
		Star	Star Grip Series 3000		Star Grip Series 3000		Star Grip Series 3000	
		Tyler Union	TufGrip Series TLD		TufGrip Series TLD		TufGrip Series TLD	
	DIP Bell Joint Restraints (4"-12") (New & Existing)	**Bell Joint Restraints for Ductile Iron Pipe (4"-12") (New & Existing) - All restraints split serrated on bell and spigot ends. Pipe 16" and greater shall have restraint gaskets or locking bells. (Wastewater only for restraint of existing DIP FM)**						
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD	
		Ford / Uni-Flange	Uni-Flange Series 1390C		Uni-Flange Series 1390C		Uni-Flange Series 1390C	
		Sigma	PV-Lok Series PWP-C		PV-Lok Series PWP-C		PV-Lok Series PWP-C	
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165	
		Star	StarGrip Series 3100S		StarGrip Series 3100S		StarGrip Series 3100S	
		Tyler Union	TufGrip-Series 300C		TufGrip-Series 300C		TufGrip-Series 300C	
	DIP Bell Joint Restraints (16" & Greater)	**Ductile Iron Pipe Bell Joint Restraints for Ductile Iron Pipe (16" & Greater) - All restraints shall have a split back-up ring for the bell and a serrated or wedge action gland for the spigot end. New installation for water & reclaimed water piping 16" and greater shall have restraint gaskets or locking bells.**						
		EBAA Iron Inc	Series 1100HD	Existing Only	Series 1100HD	Existing Only	Series 1100HD	Existing Only
		Sigma	Series SSLDH	Existing Only	Series SSLDH	Existing Only	Series SSLDH	Existing Only
		Star	Series 3100S	Existing Only	Series 3100S	Existing Only	Series 3100S	Existing Only

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Joint Restraints	Ductile iron pipe Bell Joint Restraint Gaskets and Locking Bell (4" & Above)	**Bell Joint Restraint Gaskets and Locking Bell (4" & Above) Stainless Steel locking wedges built into the gasket-rubber. ANSI/AWWA C111/A21.11 Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe. Ductile Iron Bell Joint Restraint for Push-On Pipe- Locking bell joint system that prevents joint separation and allows for joint deflection. Bells shall be painted red to verify restrained gasket.**						
		American	Fast Grip Gasket	Gasket	Fast Grip Gasket	Gasket	NA	NA
			Flex-Ring Joint	Bell Lock	Flex-Ring Joint	Bell Lock	NA	NA
			Lok-Ring Joint	Bell Lock	Lok-Ring Joint	Bell Lock	NA	NA
		Griffin	Talon RJ Gasket	Gasket	Talon RJ Gasket	Gasket	NA	NA
			Snap-Lok	Bell Lock	Snap-Lok	Bell Lock	NA	NA
		McWane Inc. DI Pipe Group	Sure Stop 350 Gasket	Gasket	Sure Stop 350 Gasket	Gasket	NA	NA
			Thrust-Lock	Bell Lock	Thrust-Lock	Bell Lock	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			Super-Lock	Bell Lock	Super-Lock	Bell Lock	NA	NA
		US Pipe	Field Lok 350 Gasket	Gasket	Field Lok 350 Gasket	Gasket	NA	NA
			Field Lok Gasket	Gasket	Field Lok Gasket	Gasket	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			HP Lok Restraint Joint	Bell Lock	HP Lok Restraint Joint	Bell Lock	NA	NA
	SS to DIP Transition Restraint	**SS to DIP Transition Restraint -Flanged stainless steel pipe from Wetwell to Valve box restrained joint transition (epoxy coated, SS hardware) Flg x PE RJ.**						
		EBAA Iron Inc	NA	NA	NA	NA	Megaflange 2100	
		Sigma	NA	NA	NA	NA	SigmaFlange with One Lock SLDE	
		Smith Blair	NA	NA	NA	NA	911 Flange - Lock Restrained FCA	
	PVC Pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain PVC pipe to mechanical joint fittings, and appurtenances.**						
		EBAA Iron Inc	Mega-lug Series 2000PV		Mega-lug Series 2000PV		Mega-lug Series 2000PV	
			NA	NA	NA	NA	Megalug Series 2200	(42"-48")
		Ford / Uni-Flange	UFR 1500 Series		UFR 1500 Series		UFR 1500 Series	
		Sigma	One Lok Series SLC/SLCE		One Lok Series SLC/SLCE		One Lok Series SLC/SLCE	
		Smith Blair	Cam Lok Series 120		Cam Lok Series 120		Cam Lok Series 120	
		Star	Star Grip Series 4000		Star Grip Series 4000		Star Grip Series 4000	
		Tyler Union	TufGrip Series TLP		TufGrip Series TLP		TufGrip Series TLP	
	PVC Bell Joint Restraints (4" - 12") (New & Existing)	**PVC Bell Joint Restraints: PVC pipe Split Serrated on Bell End and Spigot End. (4" - 12") (New & Existing)**						
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD	
		Ford / Uni-Flange	Uni-Flange Series 1390		Uni-Flange Series 1390		Uni-Flange Series 1390	
		Sigma	PV-Lok Series PWP		PV-Lok Series PWP		PV-Lok Series PWP	
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165	
		Star	Series 1100C		Series 1100C		Series 1100C	
		Tyler Union	TufGrip 300C		TufGrip 300C		TufGrip 300C	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Joint Restraints	PVC Bell Joint Restraints (16" & Greater)	**PVC Bell Joint Restraints: (16" & Greater) PVC pipe Split Serrated on Bell End and Spigot End. Water & Reclaimed Water Existing pipe only. Wastewater shall be new and existing pipe.**						
		Ford / Uni-Flange	Series 1390	Existing Only	Series 1390	Existing Only	Series 1390	
		JCM	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	
		Sigma	PV-Lok PWP	Existing Only	PV-Lok PWP	Existing Only	PV-Lok PWP	
		Smith Blair	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	
		Star	Series 1100C	Existing Only	Series 1100C	Existing Only	Series 1100C	
Pipe	PVC C900 DR 18 Bell & Spigot (4" - 12")	**C900 Bell & Spigot PVC Pipe: 4 to 12-inch - AWWA C-900, Minimum DR18 for Water, Reclaimed and Wastewater. DR14 for Fire Lines. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 4" to 12"	Certa-Lok C900/RJ	Blue	Certa-Lok C900/RJ	Pantone Purple	Certa-Lok C900/RJ	Green
		Diamond Plastics Corp	C-900	Blue	C-900	Pantone Purple	Diamond C900	Green
		Ipex Inc	C-900 Blue Brute	Blue	C-900	Pantone Purple	C900 Blue Brute	Green
		JM Eagle	C-900	Blue	C-900	Pantone Purple	C-900	Green
		National Pipe & Plastics Inc	C-900 Dura- Blue	Blue	C-900	Pantone Purple	C-900 Pipe	Green
		North American Pipe Corp (NAPCO)	C-900	Blue	C-900	Pantone Purple	C-900	Green
		Sanderson Pipe Corp	C-900	Blue	C-900	Pantone Purple	C-900	Green
	PVC C905 DR 18 Bell & Spigot 16" and Larger	**C905 Bell & Spigot PVC Pipe 16" and Larger: AWWA C-905, Minimum DR18 for all Force Mains up to 24". Minimum DR21/DR25 for 30" and greater. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 16"	NA	NA	NA	NA	Certa-Lok C905/RJ	NA
		Diamond Plastics Corp	NA	NA	NA	NA	Trans-21 DR18	Green
		Ipex Inc	NA	NA	NA	NA	IPEX Centurion	Green
		JM Eagle	NA	NA	NA	NA	C905 Big Blue	Green
		National Pipe & Plastics Inc	NA	NA	NA	NA	C905	Green
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	C905 Big Blue	Green
	HDPE C906 DR11	**HDPE Pipe DR11 AWWA C906 shall be Ductile Iron Pipe Size, PE 3408/3608/4710 DIPS manufactured in accordance with ASTM F-714 and listed with NSF. Pipe shall be marked in accordance with either AWWA C901,AWWA C906. Compression type connections are not acceptable in new installations. Pipe joints shall be butt fusion or electro-fusion with flange or adapter. All HDPE shall be color coded to the Utility. Color identifications are in accordance with the APWA/ULCC Uniform Color Code. Manufacturers shall be members in good standing with PPI to maintain approval status.**						
		JM Eagle	HDPE	DR11 Blue	HDPE	DR11 Pantone	HDPE	DR11Green
		Performance Pipe(Chevron)	Driscoplex 4000	DR11 Blue	Driscoplex 4000	DR11 Pantone	Driscoplex 4300	DR11 Green
		PolyPipe, Inc.	EHMW Poly Pipe	DR11 Blue	EHMW	DR11 Pantone	EHMW	DR11Green

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pipe	Ductile Iron Pipe	**Ductile iron/Cast iron: (4" to 12" = Class 350, 16" to 24" - Class 250, 30" to 64" = Class 200). Water and Reclaimed water shall be cement lined. Wastewater Piping shall be Protecto 401 and Holiday Free. Exterior coatings as specified. Wastewater DIP piping shall be for pump station piping only. Manufacturers shall be members in good standing with DIPRA to maintain approval status.**						
		American	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		Griffin	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		McWane Inc. DI Pipe Group	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		US Pipe	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
Sample	Sample Station	**Sample Stations - Bacteriological Sample Station with built in flush system, all internal piping to be 2", brass and includes lockable green enclosures.**						
		Safety-Guard	SG-BSS-05 pedestal #77	green enclosure	NA	NA	NA	NA
		Water Plus Corp	Model 5000	green	NA	NA	NA	NA
Services	Brass Service Saddles	**Brass Service Saddles for 1" & 2" water & reclaimed water services on 4" through 12" Mains - Service saddles can be hinge or bolt controlled OD saddles to be used on C-900 and existing IPS OD PVC pipe.**						
		Ford	Series S-70, S-90	4"-12"	Series S-70, S-90	4"-12"	NA	NA
		AY McDonald	Model 3891 / 3895,3801 / 3805	4"-12"	Model 3891 / 3895,3801 / 3805	4"-12"	NA	NA
		Mueller	Series S-13000/H-13000	4"-12"	Series S-13000/H-13000	4"-12"	NA	NA
	Service Saddles	**Service Saddles for 1" (CC) & 2" (Iron pipe threads) Water & Reclaimed Water services on mains greater than 12". Service saddles for 2" taps (iron pipe threads) on 4" mains and greater for Waste Water. : Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on C-900 / C905 or DI for all 1-in and -2in taps on pipes over 12in.**						
		Ford	Series FC202	16" & greater	Series FC202	16" & greater	Series FC202	4" & greater
		JCM	Series 406	16" & greater	Series 406	16" & greater	Series 406	4" & greater
		Mueller	DR2S	16" & greater	DR2S	16" & greater	DR2S	4" & greater
		Romac	Series 202NS	16" & greater	Series 202NS	16" & greater	Series 202NS	4" & greater
		Smith Blair	Series 317	16" & greater	Series 317	16" & greater	Series 317	4" & greater
	Service Saddles for HDPE	**Service Saddles for 1" (CC) & 2" (Iron Pipe threads) Water and Reclaimed Water Services: Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on HDPE for all 1-in and -2in taps. Taps to HDPE pipe shall be approved on a case by case basis.**						
		Ford	Series FCP202		Series FCP202		Series FCP202	
		Romac	Series 202N-H		Series 202N-H		Series 202N-H	
		Smith Blair	Series 317-1 for HDPE		Series 317-1 for HDPE		Series 317-1 for HDPE	
	Corporation Stops Ball Type	**Corporation Stops Ball Type (1-inch with AWWA taper C threads only/pack joint outlet for CTS) 2" Corporation Stop Ball Type shall be 2" MIP X FIP threads.**						
		Ford	FB1000, FB1700-7		FB1000, FB1700-7		FB1700-7	2" ARV
		AY McDonald	4701B-22, 3149B2		4701B-22, 3149B2		3149B2	2" ARV
		Mueller	P25008, B-20046		P25008, B-20046		B-20046	2" ARV

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Services	Curb Stops	**Curb Stops - Straight Valves: Ball type compression 2" cts O.D. tubing by 2" FIP**						
		Ford	B41-777W		B41-777W		NA	NA
		AY McDonald	6102W-22		6102W-22		NA	NA
		Mueller	P25172		P25172		NA	NA
	Curb Stops	**Curb Stops - Straight Valves: ball type compression x compression**						
		Ford	B44-444W		B44-444W		NA	NA
		AY McDonald	6100W-22		6100W-22		NA	NA
		Mueller	P25146		P25146		NA	NA
	PE tubing	**Polyethylene tubing: AWWA C901. UV protection (SDR-9) 1-inch and 2-inch only. PE 3408 / PE 4710**						
		Charter Plastics	Blue Ice		Lav Ice		NA	NA
		Endot	Endopure Blue		Endocore Lavender		NA	NA
		JM Eagle	Pure-Core		NA	NA	NA	NA
Tapping Sleeves and Valves	Line Stops	**Line Stops**						
		JCM						
		Romac						
		Smith Blair						
	Tapping Sleeves	**Tapping Sleeves: (Mechanical joint for taps on cast iron, ductile iron, PVC & AC pipe, including size on size) with stainless steel nuts and bolts.**						
		American Flow Control	Series 2800		Series 2800		Series 2800	
			Series 1004		Series 1004		Series 1004	
		Clow	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC
			Series F-5207	A/C Pipe	Series F-5207	A/C Pipe	Series F-5207	A/C Pipe
		JCM	Series 414	FBE	Series 414	FBE	Series 414	FBE
		Mueller	Series H-615	DIP/PVC	Series H-615	DIP/PVC	Series H-615	DIP/PVC
			Series H-619	A/C Pipe	Series H-619	A/C Pipe	Series H-619	A/C Pipe
		Smith Blair	Style 623	FBE	Style 623	FBE	Style 623	FBE
	Tapping Valves: 12" and smaller	**Tapping Valves: 12" and smaller - Tapping Valves shall be furnished with an alignment lip and installed in the vertical position for Water and Reclaim Water. Wastewater shall be installed horizontally and abandoned in the open position. Tapping valves shall be resilient seated only and meet the requirements of AWWA C509 or C515**						
		American Flow Control	Series 2500	Alignment Lip	Series 2500	Alignment Lip	Series 2500	Alignment Lip
		Clow	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip
		Mueller	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Tapping Sleeves and Valves	Tapping Valves: 16" and Larger	**Tapping Valves: 16" and Larger - Tapping valves shall be furnished with an alignment lip and be installed in the vertical position for Water and Reclaimed Water. No tapping valve shall be installed horizontally for Water and Reclaim Water unless approved by the engineer. Tapping Valves 16" and larger AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a spur gear actuator unless noted by the engineer. All tapping valves above 24" shall be furnished with NPT pipe plugs for flushing the tracks when valves are installed horizontally. Tapping valves for Wastewater shall be installed horizontally and abandoned in open position.**						
		American Flow Control	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port
		Clow	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port
		Mueller	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port
Valves	Butterfly Valve 42" and Above	**Butterfly Valves 42"and above. AWWA C504. Actuators input torques based on 150 psi valve pressure and 16 fps velocity with a maximum input of 80 ft-lb on 2" nuts and shall withstand 250 ft-lbs. Valve seats shall be leak-tight in both directions at 150 psi.**						
		Clow	Style #1450		Style #1450		NA	NA
		Dezurik	BAW		BAW		NA	NA
		Mueller / Pratt	LINSEAL III / Groundhog		LINSEAL III / Groundhog		NA	NA
	Check Valves	**Valves (Check) 4-inch and Larger (8 mil epoxy lined)**						
		American Flow Control	NA		NA		Series 600 or 50 line	
		Clow / M&H / Kennedy	NA		NA		106	
		Mueller	NA		NA		Series 2600	
	Gate Valves 4" - 12"	**Gate Valves 12" and smaller - resilient seated only AWWA C509 or C515. Valve seat shall be leak-tight in both directions at 150 psi.**						
		American Flow Control	Series 2500		Series 2500		NA	NA
		Clow	Series F-6100		Series F-6100		NA	NA
		Mueller	Series A-2360		Series A-2360		NA	NA
	Gate Valves (Vertical) 16" and Up	**Gate Valves 16" and larger (Vertical Installation) AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a gear actuator unless noted by the engineer. Valve seat shall be leak-tight in both directions at 150 psi.**						
		American Flow Control	Series 2500		Series 2500		NA	NA
		Clow	Series F-6100		Series F-6100			
		Mueller	Series A-2361		Series A-2361		NA	NA

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Valves	Plug Valves	**Plug Valves - Bi-directional, MJ & Flanged (min. 8mil fusion bonded epoxy with stainless steel bolts), gear operator to be sized for rated pressure of the valve. Valves 4"-20" shall be 80% Full Port and valves 24" and greater shall be minimum of 70% full port. Valve shall be factory tested to minimium 100 PSI in both directions.**						
		Clow	NA	NA	NA	NA	F-5412 FLG	4" & up
			NA	NA	NA	NA	F-5413 MJ	4" & up
		Dezurik	NA	NA	NA	NA	Series PEF or PEC	4"& up
		Millikan / Pratt	NA	NA	NA	NA	Eccentric / Ballcentric	4"& up
		Val-Matic	NA	NA	NA	NA	5600 or 5800 (FLG)	4" & up
			NA	NA	NA	NA	5700 or 5900 (MJ)	4" & up
Valve Boxes	Valve Boxes with Locking Lids (Cast Iron)	**Two piece standard screw type Heavy Duty Valve Boxes with Locking Lids (Cast Iron) and type of service cast in heavy duty traffic lid (H20 loading) ASTM A48**						
		Bingham/Taylor	Series 4905	Box	NA	NA	Series 4905	Box
			4905-X	Extension	NA	NA	4905-X	Extension
			4904-L	Blue Water Locking Lid	NA	NA	4904-L	Green Sewer locking Lid
		Sigma	Series VB 261X-267X	Box	VB-25031LK-VB-2612	Box	Series VB 261X-267X	Box
			VB 6302	Extension	VB-6302	Extension	VB 6302	Extension
			VB 4650W	Blue Water Locking Lid	VB2503LK	Purple Square Locking Lid	VB 4650S	Green Sewer locking Lid
		Star	Series VB-0002	Box	NA	NA	Series VB-0002	Box
			VBEX 12-24S	Extension	NA	NA	VBEX 12-24S	Extension
			VBLIDLOCK	Blue Water Locking Lid	NA	NA	VBLIDLOCK	Green Sewer locking Lid
		Tyler Union	Series 6850	Box	NA	NA	Series 6850	Box
			58, 59, 60	Extension	NA	NA	58, 59, 60	Extension
			Locking Lid	Blue Water Locking Lid	NA	NA	Locking Lid	Green Sewer locking Lid
	Valve Box	**For mains equal to, or greater than, 16" diameter or equal to greater than 6' feet deep**						
		American Flow Control	# 2A - 9A Retrofit Valve Box Insert	Fit inside std valve boxes	NA		2A - 9A Retrofit Valve Box Insert	Green Sewer locking Lid
		Mueller Company	MVB050C thru MVB130C with Extension Stem MVB875 Guide Plate	Blue Water Locking Lid	MVB050CR thru MVB130CR with Extension Stem MVB875 Guide Plate	Purple Square Locking Reclaim Lid	MVB050C thru MVB130C with Extension Stem MVB875 Guide Plate	Green Sewer locking Lid

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Coatings	Anti-Graffiti Paint	**Block Walls-Anti-Graffiti Paint per Section 3119 Coatings & Linings**						
		American Building Restoration Products	NA	NA	NA	NA	Polyshield Graffiti Preventer for Unpainted Masonry Type B	Super Bio Strip or Strip it all
		Tnemec / Chemprobe	NA	NA	NA	NA	626 DUR A PEL	680 Mark A Way
		Professional Products of Kansas, Inc	NA	NA	NA	NA	Professional Water Seal & Anti-Graffitiant (PWS-15 Super Strength)	Professional Phase II Cleaner
	Coatings for Existing Manholes	**Rehabilitation corrosion protection system per Section 3119 Coatings & Linings. Interior coating for force main connections to existing concrete manholes only. New precast structures and existing pump stations shall be lined.**						
		CCI Spectrum, Inc	NA	NA	NA	NA	Spectrashield	min of 500 mils
		Kerneos Aluminate Technologies	NA	NA	NA	NA	Sewpercoat	1" (1000mil)
		Raven Lining System	NA	NA	NA	NA	Raven 155 Primer Raven 405	min 8 mils min 125 mils
		Sauereisen	NA	NA	NA	NA	210 Series Topcoat Glaze 210G	min 125 mils min 20 mils
		Tnemec	NA	NA	NA	NA	Series 434 Topcoat Glaze 435	min 125 mils 15-20 mils
PVC Pipe and fittings	Pipe SDR 35 Gravity Mains	**PVC Pipe for Gravity SDR26/SDR 35 (Green in color) ASTM-D034. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed	NA	NA	NA	NA	Gravity Sewer Pipe	
		Diamond Plastics Corp	NA	NA	NA	NA	Sani-21 SDR-35	
		JM Eagle	NA	NA	NA	NA	Gravity Sewer	
		National Pipe & Plastics, Inc.	NA	NA	NA	NA	Ever-Green Sewer Pipe	
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	Gravity Sewer	
		Sanderson Pipe Corp	NA	NA	NA	NA	Gravity Sewer	
	Locate Balls	**Locating Marker Systems - Wastewater Locator balls placed at all sanitary sewer cleanouts**						
		3M	NA	NA	NA	NA	3M™ EMS 4" Extended Range 5' Ball Marker 1404-XR	
	Fittings SDR 35	**Fittings, Adapters and Plugs - Gravity PVC ASTM-D3034, Min SDR26/ SDR 35**						
		GPK Products, Inc.	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Harrington Corporation (HARCO)	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Multi Fittings Corp.	NA	NA	NA	NA	SDR26/SDR 35 Trench Tough Sewer Fittings	
		JM Eagle	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Plastic Trends Inc	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		TIGRE USA, Inc.	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
PVC Pipe a	Flexible Pipe Connectors	**Flexible Pipe Connectors and Transitions**						
		Fernco	NA	NA	NA	NA	1002, 1051, 1056 Series	
		Indiana Seal	NA	NA	NA	NA	102, 151, 156 Series	
		Mission Rubber	NA	NA	NA	NA	MR02, MR51, MR 56 Series	
Precast Concrete Structures	MH Lids	**Frame and Cover**						
		USF Fabrication Inc.	NA	NA	NA	NA	USF 225-AS	
	Adj Ring	**Top Adjusting Rings - HDPE with heavy duty loading (H-20)**						
		Ladtech, Inc	NA	NA	NA	NA	24R, 24S with Rope Sealant CS2455	
	Hatches	**Wet Well and Valve Vault Access Frames and Covers (Include the term "Confined Space" etched or cast into the cover with recessed lock & hasp. Frames and covers per manufacturers specifications.**						
		Halliday Products	NA	NA	NA	NA	S1R or S2R Series	
		USF Fabrication Inc.	NA	NA	NA	NA	APS or APD Series	
	Precast Concrete Structures	**Precast Manhole and Wetwell Structures ASTM C478. Precast concrete shall be batched with concrete dyed crystalline waterproofing admixture with corrosion protection. Concrete without admixture or without color tint /tracer shall be rejected.**						
		Allied Precast	NA	NA	NA	NA	Dyed Admix	
		Atlantic Concrete Products, Inc.	NA	NA	NA	NA	Dyed Admix	
		Delzotto Products, Inc.	NA	NA	NA	NA	Dyed Admix	
		Dura Stress Underground Inc.	NA	NA	NA	NA	Dyed Admix	
		Hanson Pipe & Product	NA	NA	NA	NA	Dyed Admix	
		Mack Concrete	NA	NA	NA	NA	Dyed Admix	
		Oldcastle Precast	NA	NA	NA	NA	Dyed Admix	
		Standard Precast Inc.	NA	NA	NA	NA	Dyed Admix	
	Concrete Admix	**Crystalline Waterproofing Concrete Admix with color dye shall be added to all concrete structures (precast and cast-in-place) to provide waterproofing and corrosion resistance. Concrete without admixture or without color tint / tracer shall be rejected. % concentration of admix with colored dye added to the mix shall be based on weight of cement.**						
		Kryton International	NA	NA	NA	NA	KIM K-301R (with red dye)	2%
		Xypex Chemical Corp	NA	NA	NA	NA	Xypex Admix C-1000Red (with red dye)	3.0 - 3.5%
	Liners	**Interior Liner for New or existing Precast Manhole and Precast Wetwell Structures per Section 3119 Coatings & Linings**						
		AFE	NA	NA	NA	NA	Fiberglass Liner	
		AGRU Liner	NA	NA	NA	NA	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		Containment Solutions Inc. (Flowtite)	NA	NA	NA	NA	Fiberglass Liner	
		GSE Studliner	NA	NA	NA	NA	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		GU Liner	NA	NA	NA	NA	Reinforced Plastic Liner	
		L & F Manufacturing	NA	NA	NA	NA	Fiberglass Liner	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Precast Concrete Structures	Heat Shrink Seal	**Heat Shrink Seal - Precast structures shall be primed with manufacturer approved primer prior to application of heat shrunk encapsulation.**						
		Canusa-CPS	NA	NA	NA	NA	Wrapid Seal with WrapidSeal Primer (Canusa G Primer)	
		Pipeline Seal & Insulator, Inc (PSI)	NA	NA	NA	NA	Riser Wrap with Polyken 1027 or 1039 primer	
	Jointing Material	**Jointing Material Min. 2" width for all products to ensure squeeze out with manufacturer approved primer.**						
		Henry Company	NA	NA	NA	NA	Ram-Nek	with Primer
		Martin Asphalt Company	NA	NA	NA	NA	Evergrip 990	with Primer
		Trelleborg Pipe Seals	NA	NA	NA	NA	NPC – Bidco C-56	with Primer
	Pipe Seals Gravity	**Resilient Connector Pipe Seals, Manhole - Gravity less than 12-inch and less than 15-ft deep**						
		Atlantic Concrete	NA	NA	NA	NA	A-Lok (cast-in-place)	
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal (cast-in-place)	
		IPS	NA	NA	NA	NA	Wedge Style	
		NPC	NA	NA	NA	NA	Kor-N-Seal Model WS	
		Press seal gasket	NA	NA	NA	NA	PSX Direct Drive	
	Pipe Seals Gravity	**Cast in Place Pipe Seals, Manhole - Gravity Greater Than or Equal to 12-inch and all pipe sizes greater than 15-ft deep**						
		Atlantic Concrete	NA	NA	NA	NA	A-Lok	cast in place
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal	cast in place
	FM Pipe Seals	**Modular Pipe Seals for Wet Well and Valve Box penetrations and all forcemain connections to existing and new precast concrete structures. EPDM Rubber with 316 SS Hardware**						
		CCI Pipeline Systems	NA	NA	NA	NA	Wrap-It Link WL-SS Series	
		Pipeline Seal & Insulator, Inc / Link Seal	NA	NA	NA	NA	Link-Seal S-316 Modular Seal	
		Proco Products, Inc	NA	NA	NA	NA	PenSeal ES-PS Series	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Generator	Gen	**Generator Systems, Fixed Shall be UL 2200 Certified.**						
		Caterpillar	NA	NA	NA	NA	CAT Diesel Generator Set	
		Cummins Power Generation	NA	NA	NA	NA	Diesel Generator Set	
	Fuel Tanks	**Generator Fuel Tanks. Shall be UL2085 certified.**						
		Convault	NA	NA	NA	NA	CVT-3SF or CVT-3FF	
		Phoenix	NA	NA	NA	NA	Envirovault	
	GR	**Generator Receptacle (GR)**						
		Cooper Crouse-Hinds	NA	NA	NA	NA	AR2042 (230V, 200A, 3P, 4W)	With AJA1 Angle Adaptor
		Cooper Crouse-Hinds	NA	NA	NA	NA	AR2042-S22 (460V, 200A, 3P, 4W)	With AJA1 Angle Adaptor
		Pyle National	NA	NA	NA	NA	JRE-4100 (230V, 100A, 3P, 4W)	
	ATS	**Generator Transfer Switch**						
		Russelectric	NA	NA	NA	NA	RMTD Series with model 2000 controller	NEMA 12/3R 316SS Enclosure
Odor Control Units	Biotrickling Filters	**Biotrickling filters**						
		BioAir	NA	NA	NA	NA		
		Biorem	NA	NA	NA	NA	Biosorbens BTF	
		Envirogen	NA	NA	NA	NA	BTF	
		Siemens	NA	NA	NA	NA	Zabocs BTF	
	Carbon Adsorption Units	**Carbon Adsorption Units**						
		Calgon	NA	NA	NA	NA		
		Pure Air Filtration	NA	NA	NA	NA		
		Siemens	NA	NA	NA	NA		
Pressure Gauges	Pressure Gauges	**Pressure Gauges shall have Diaphragm Seals. Oil filled.**						
		Ashcroft	NA	NA	NA	NA	10 1008SL 02L 60# 25 200SS 02T XYTSE	Gauge Diaphragm Seal
		Trerice	NA	NA	NA	NA	D83LFSS4002LA100 - Gauge M51001SSSS - Diaphragm Seal D99100 Fill and Mount Charge	
		Winter Gauges	NA	NA	NA	NA	PFQ770 0-60 PSI D70950 top D70954 Bottom	
Pumps	Pumps	**Submersible Pumps**						
		ABS	NA	NA	NA	NA		
		Flygt	NA	NA	NA	NA		

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pumps	Floats	**Float Regulator (FR) - Duplex and Triplex Pump Stations**						
		Atlantic Scientific	NA	NA	NA	NA		Roto-Float
	Radar	**Radar - Pulse Burst Radar Transmitter. Input 24 VDC and Output 4-20 mA**						
		Magnetrol	NA	NA	NA	NA		R82-520A-011
Pump Station Main Ser	Main Srvc Disconne	**Main Service Disconnect Breaker**						
		Square D	NA	NA	NA	NA		H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)
	Surge Protector Device	**Surge Protector - UL 1449, 3rd Edition listed and labeled, minimum 10 year warranty, NEMA LS-1 and IEEEC62, 41/45 tested with NEMA 4X enclosure, internal fusing, voltage and phase to match service. Rated 80,000 amps per mode for Duplex & Triplex stations and 150,000 Amperes per mode for Master Stations. All devices shall be provided with a NEMA 4X Plastic enclosure which is approved in lieu of stainless steel.**						
		Current Technology (Power & Systems	NA	NA	NA	NA		XN-80, TG-150 or CurrentGuard 150 Plus Series
		Josyln AKA (Total Protection Solutions)	NA	NA	NA	NA		TSS-ST 160 Series, ST 300 Series or JSP-300 Series
		Surge Suppressors, Inc	NA	NA	NA	NA		LSE Series or SHL Series
Sub Panel	Sub Panel	**Sub-Panel Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated-finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
Pump Station Control Panel	Control Panel	**Control Panel Supplier**						
		ECS	NA	NA	NA	NA		
		Sta-Con Inc	NA	NA	NA	NA		
	Enclosure	**Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
	Mnts	**Mounting Channel for Enclosures**						
		Unistrut Stainless Steel	NA	NA	NA	NA		1" 5/8 x 1" 5/8 316 SS
	Seal-off	**Explosion-Proof Sealoff**						
		Cooper Crouse-Hinds	NA	NA	NA	NA		EYSR - 2 Inch Min.
	FL	**Flasher (FL)**						
		MPE	NA	NA	NA	NA		025-120-105
		SSAC	NA	NA	NA	NA		FS-126

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	AL	**Alarm Light / With Base and Globe (AL)**						
		American Electric	NA	NA	NA	NA	F32552	
		Red Dot Globe Red Dot Base	NA	NA	NA	NA	VGLR-01 VA-01	
	AH	**Alarm Horn (AH)**						
		Wheelock	NA	NA	NA	NA	3IT-115-R	
	Fuse	**Fuses (F)**						
		Bussmann	NA	NA	NA	NA	FNQ-R or KTK-R	
	HOA	**Hand-Auto-Off Selector (HOA)**						
		Square D	NA	NA	NA	NA	9001-SKS43B	
	HSS	**Horn Silence Button (HSS)**						
		Square D	NA	NA	NA	NA	9001-SKR1RH5	
	Inter-lock	**Mechanical Interlock**						
		Square D	NA	NA	NA	NA	S29354	
	Breakers	**Control Panel Main Circuit Breaker (MCB) With S29450 Circuit Breaker Auxiliary Switch**						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Emergency Circuit Breaker (ECB) With S29450 Circuit Breaker Auxiliary Switch						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Motor Circuit Breaker (MB)						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Control Circuit Breaker/ GFCI Receptacle Breaker/ SCADA Breaker						
		Square D	NA	NA	NA	NA	QOU120	
	MS	**Motor Starter (MS)**						
		Square D	NA	NA	NA	NA	Type S Class 8536	
	OL	**Overload Heater(OL)**						
		Square D	NA	NA	NA	NA	Part number will vary with size needed	
	OR	**Overload Reset**						
		Square D	NA	NA	NA	NA	9066-RA1	
	Transformer	**Control Circuit Transformer (XMFR)**						
		Square D	NA	NA	NA	NA	9070TF75D23	120/24 Volt .075 KVA
		Main Circuit Transformer (MCT)						
		Square D	NA	NA	NA	NA	9070T2000D1	480/120 2KVA
	SPB	**Supplemental Protector Breaker - 3 pole, 1-amp for Phase Monitor**						
		Square D	NA	NA	NA	NA	MG24532	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	PM	**Phase Monitor (PM)**						
		MPE 240 V.	NA	NA	NA	NA	001-230-118-OVG5	
		MPE 480 V.	NA	NA	NA	NA	002-480-123-OVG5	
	Pump Alternator	**Pump Automatic Alternator (PAA)**						
		Diversified Duplex	NA	NA	NA	NA	ARA-120-ACA	
		Diversified Triplex	NA	NA	NA	NA	ARA-120-AME	
		MPE Duplex	NA	NA	NA	NA	008-120-13SP	
		MPE Triplex	NA	NA	NA	NA	009-120-23P	
		MPE Triplex Socket	NA	NA	NA	NA	SD-12-PC	
	Alt. Test Switch	**Alt. Test Switch**						
		Carling Technologies	NA	NA	NA	NA	6GG5E-78	
		Honeywell	NA	NA	NA	NA	2TL1-50	
	Relay	**Relay**						
		Potter Brumfield 24 Volt	NA	NA	NA	NA	KRPA-11AN-24	
		Potter Brumfield 120 Volt	NA	NA	NA	NA	KRPA-11AN-120	
		Square D 24 Volt	NA	NA	NA	NA	8501KP12P14V14	
		Square D 120Volt	NA	NA	NA	NA	8501KP12P14V20	
	Relay Base	**Relay Base**						
		IEDC 8 Pin Relay Base 600 Volt	NA	NA	NA	NA	SR2P-06	
	Duplex Receptacle / GFCI	**Duplex Receptacle/GFCI (DR) Upgraded to 20 Amp**						
		Hubbell	NA	NA	NA	NA	GFTR20BK	
		Pass & Seymour	NA	NA	NA	NA	2095TRBK	
	ETM	**Elapse Time Meter (ETM)**						
		Reddington	NA	NA	NA	NA	711-0160	
	Grounding	**Grounding System**						
		Marathon	NA	NA	NA	NA	Neutral Isolation Block 1421570	
		Panduit	NA	NA	NA	NA	Ground Lug LAM2A 1/0 - 014 -6Y	
		Square D	NA	NA	NA	NA	Ground Buss PK7GTA	
	TS	**Terminal Strip (TS)**						
		Marathon	NA	NA	NA	NA	Series 200	
		Square D	NA	NA	NA	NA	9080GR6	
	TS	**Terminal Strip End Blocks and End Clamps**						
		Square D	NA	NA	NA	NA	9080GM6B & 9080GH10	

APPENDIX D **LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	PL	**Pilot Light (PL) 24 Volt with 1819 Bulb**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelight 930507X	
	RL	**Run Indicator Light (RL) 120 Volt**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelites 930507X With 120MB Bulb	
	MT	**Moisture and Temperature Failure Light (MT) 120 Volt with 120MB Bulb**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelites 930507X	
Sluice	Sluice Gate	**Sluice Gate for Wet Well with Motorized Operator**						
		BNW	NA	NA	NA	NA	Model 77 - 316 SS	
		Fontaine	NA	NA	NA	NA	Model 20 - 316 SS	
VFD	VFD	**Variable Frequency Drives**						
		Square D	NA	NA	NA	NA		

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APPENDIX 2

FDEP WASTEWATER PERMIT

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FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

CENTRAL DISTRICT
3319 MAGUIRE BOULEVARD, SUITE 232
ORLANDO, FLORIDA 32803

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

HERSCHEL T. VINYARD JR.
SECRETARY

PERMITTEE:
JOSE HERNANDEZ PE
ORANGE COUNTY UTILITIES
9150 CURRY FORD RD
ORLANDO FL 32825
jose.hernandez2@ocfl.net

PERMIT NUMBER: 0133232-092
COUNTY: Orange
PROJECT: Exchange Drive Forcemain Replacement
GENERATING: No new flow
CONNECTED TO: OCUD/South WRF (FLA107972)

Dear Mr. Hernandez:

This letter acknowledges receipt of your Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System for the subject project. Our office received the Notice on February 20, 2014.

This is to advise you that the Department does not object to your use of such General Permit.

Please note the attached requirements apply to your use of this General Permit for constructing the proposed domestic wastewater collection/transmission system. In accordance with Rule 62-4.540(13), F.A.C., this authorization shall be good for a period of five years from the date of this letter.

You are further advised that the construction activity must conform to the description contained in your Notification/Application for Constructing a Domestic Wastewater Collection/Transmission System and that any deviation will subject the permittee to enforcement action and possible penalties.

Sincerely,

Dennise Judy
Program Manager
Wastewater Permitting

Date: February 21, 2014

DJ/cs

cc: David Mahler, P.E. (via e-mail: dmahler@cphcorp.com)
Cindy Stafford, DEP WW (via email)

REQUIREMENTS FOR USE OF THE GENERAL PERMIT FOR DOMESTIC WASTEWATER COLLECTION/TRANSMISSION SYSTEMS:

1. This general permit is subject to the general permit conditions of Rule 62-4.050, F.A.C., as applicable. This rule is available at the Department's Internet site at: http://www.dep.state.fl.us/water/wastewater/rules.htm#domestic [62-4.050]

2. This general permit does not relieve the permittee of the responsibility for obtaining a dredge and fill permit where it is required. [62-604.600(6)(b)1, 11-6-03]

3. This general permit cannot be revised, except to transfer the permit. [62-604.600(6)(b)2, 11-6-03]

4. Upon completion of construction of the collection/transmission system project, and before placing the facilities into operation for any purpose other than testing for leaks or testing equipment operation, the permittee shall submit to the Department's Central District Office, Form 62-604.300(8)(b), Request for Approval to Place a Domestic Wastewater Collection/Transmission System into Operation. This form is available at the Department's Internet site at: http://www.dep.state.fl.us/water/wastewater/forms.htm [62-604.700(2), 11-6-03]

5. The new or modified collection/transmission facilities shall not be placed into service until the Department clears the project for use. [62-604.700(3), 11-6-03]

6. Abnormal events shall be reported to the Department's Central District Office in accordance with Rule 62-604.550, F.A.C. For unauthorized spills of wastewater in excess of 1000 gallons per incident, or where information indicates that public health or the environment may be endangered, oral reports shall be provided to the STATE WARNING POINT TOLL FREE NUMBER (800) 320-0519 as soon as practical, but no later than 24 hours from the time the permittee or other designee becomes aware of the circumstances. Unauthorized releases or spills less than 1000 gallons per incident are to be reported orally to the Department's Central District Office within 24 hours from the time the permittee, or other designee becomes aware of the circumstances. [62-604.550, 11-6-03]

APPENDIX 3

Part H Technical Provisions – TP 900-3 – Groundwater Treatment and Disposal

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TP 900-3 – Groundwater Treatment and Disposal

GROUNDWATER TREATMENT AND DISPOSAL

General

If concentrations of tested groundwater quality parameters exceed those allowable in the Florida Department of Environmental Protection (FDEP) Generic Permit for the Discharge of Produced Groundwater from any Non-Contaminated Site Activity (62-621.300(2), F.A.C.), treatment may be required under this technical provision.

The term treatment as used in this technical provision means the application of all FDEP approved techniques and/or methods available to remove the exceedances out of dewatering effluent except impounding. Impounding is not considered a treatment method for purposes of compensation under this technical provision.

The CONTRACTOR shall include in his/her bid all applicable costs, including monitoring, resulting from treatment and disposal of contaminated groundwater with concentration levels that exceed the allowable limits of the FDEP generic permit, and shall not be entitled to any adjustment in the Contract Price as a result of any change in the permit fees or unanticipated treatment and disposal costs.

Prior to any work commencing, and for the duration of the work, the CONTRACTOR is responsible for meeting all the conditions of the applicable permits and submitting any required reports to the appropriate agencies.

The CONTRACTOR shall dewater only in relation to the location and relocation of facilities owned by the COUNTY. No compensation shall be provided for dewatering performed for facilities that are not owned by the COUNTY.

Permitting

If exceedances are found in the dewatering effluent, the CONTRACTOR will be required to:

1. Immediately notify the COUNTY and report the exceedances that are encountered.
2. Meet with the FDEP to determine any and all alternatives that are acceptable.
3. Obtain prior COUNTY approval of treatment and disposal alternatives.
4. Obtain prior written COUNTY authorization to use pay item TP 900-3-1.
5. Apply and obtain any and all permits and/or treatment approvals that FDEP requires including, but not limited to:

    a. Generic Permit for Discharges from Petroleum Contaminated Sites (62-621.300(1), F.A.C.). Allows discharges from sites with automotive gasoline, aviation gasoline, jet fuel, or diesel fuel contamination.

b. Permit for all Other Contaminated Sites (62-04; 62-302; 62-620 & 62-660, F.A.C.). The coverage is available only through the individual NPDES permit issued by FDEP. Allows discharges from sites with general contaminant issues, i.e. ground water and/or soil contamination other than petroleum fuel contamination.

c. Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity (62-621.300(2), F.A.C.).

d. Generic Permit for Stormwater Discharge from Large or Small Construction Activities (62-621.300(4) (a), F.A.C.).

6. Apply and obtain any and all permits and/or treatment approvals that the Water Management District requires including, but not limited to:

a. No-Notice Short-Term Dewatering Permit (40E-20.302(3), F.A.C.) If the CONTRACTOR'S proposed work is expected to exceed 90 days in duration, or does not meet any of the other requirements listed with the requirements of Rule 40E-20.302(3), the CONTRACTOR must apply for and obtain a Dewatering General Water Use Permit (40E-20.302(2) F.A.C.)

The CONTRACTOR shall not be entitled to file, or recover under, any delay claim based on preparation of permit applications and the time required for obtaining the applicable permits. If, prior to or during the dewatering, it is determined that the disposal or discharge of the dewatering effluent is not authorized by the FDEP's Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity, the CONTRACTOR shall diligently pursue further required permit(s) from FDEP or other agencies without resort to delay claims or recompense from the COUNTY for either permit application activities or the time required to obtain such permits.

The CONTRACTOR shall consider and anticipate the potential need to obtain the herein discussed permits in developing his schedule, and shall make every effort to avoid or minimize potential impacts to his critical path that might result from delays in dewatering activities due to the time necessary for the CONTRACTOR to obtain the necessary permits. The CONTRACTOR shall make every effort to schedule activities requiring dewatering as late as possible during his schedule, and shall schedule activities not impacted by dewatering as early as possible. For each day, up to a maximum of one hundred eighty (180) days that the CONTRACTOR diligently pursues such permit(s) and is unable to avoid adversely impacting his critical path, a day will be added to the time allotted to the CONTRACTOR to complete performance of the Project.

TP 900-3 – Groundwater Treatment and Disposal

Treatment

The CONTRACTOR shall implement the appropriate treatment that is acceptable to FDEP, COUNTY, and, if necessary, the Water Management District to attain compliance for all exceedances encountered during dewatering activities. Treatments may include, but are not limited to: chemical treatment, ion exchange treatment, filtration, and disposal of discharged groundwater in a properly permitted facility.

The CONTRACTOR shall:

1. Make every effort to minimize the spread of contamination into uncontaminated areas;

2. Provide for the health and safety of all workers at the job site and make provisions necessary for the health and safety of the public that may be exposed to any potentially hazardous conditions;

3. Ensure such provisions adhere to all applicable laws, rules or regulations covering hazardous conditions in a manner commensurate with the level of severity of the conditions;

4. If necessary, provide contamination assessment and remediation personnel to handle site assessment, determine the course of action necessary for site security, and perform the necessary steps under applicable laws, rules, and regulations for additional assessment and/or remediation work to resolve the contamination issue;

5. Delineate the contamination area(s), any staging or holding area required, and develop a work plan that will provide the schedule of projected completion dates for the final resolution of the contamination issue;

6. Maintain jurisdiction over activities inside any delineated contamination areas and any associated staging or holding areas;

7. Be responsible for the health and safety of workers within the delineated areas;

8. Provide continuous access to representatives of regulatory or enforcement agencies having jurisdiction.

Method of Measurement

Quantities to be paid for under this Section shall be the actual number of calendar days, when Groundwater Treatment & Disposal occurs. This does not include preparation of permit application(s) or time to obtain the permit(s).

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Basis of Payment

Groundwater Treatment & Disposal will be paid for at the contract unit price per day. The price and payment for groundwater treatment and disposal shall constitute full compensation for cost of permitting and providing all labor, materials, tools, equipments, monitoring, reporting, treating and disposing of groundwater produced from dewatering systems.

Item No: 900-3-1 Groundwater Treatment & Disposal - Per Day