
IFB NO. Y16-702-PH

ISSUED: September 4, 2015

INVITATION FOR BIDS

FOR

SUMMERPORT VILLAGE WATER MAIN REPLACEMENT

**PART H
TECHNICAL SPECIFICATIONS**

PART H

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ISSUED FOR BID
CONTRACT DOCUMENT
TECHNICAL SPECIFICATIONS

Summerport Village WM Replacement

PREPARED FOR



Orange County Utilities
9150 Curry Ford Road
Orlando, Florida 32825

August 2015

ORANGE COUNTY UTILITIES
Summerport Village Water Main Replacement
Technical Specifications

Table of Contents

DIVISION 01 - GENERAL REQUIREMENTS

<u>Section</u>	<u>Title</u>
01001	General Work Requirements
01010	Summary of Work
01021	Soils Report and Other Information
01025	Measurement and Payment
01027	Application for Payment
01041	Project Coordination
01050	Surveying and Field Engineering
01065	Permits and Fees
01070	Abbreviations and Symbols
01200	Project Meetings
01300	Submittals
01310	Construction Progress Schedules
01370	Schedule of Values
01380	Audio-Visual Documentation
01410	Testing and Testing Laboratory Services
01505	Mobilization
01570	Maintenance of Traffic
01590	Construction Field Office
01610	Delivery Storage and Handling
01700	Project Closeout
01720	Project Record Documents

DIVISION 02 – SITE WORK

<u>Section</u>	<u>Title</u>
02080	Abandonment, Removal and Salvage or Disposal of Existing Pipe Removed from Service
02100	Erosion and Sediment Control
02140	Dewatering
02215	Finish Grading
02220	Excavating Backfilling and Compacting
02230	Site Preparation
02320	Trenching, Bedding and Backfilling
02576	Concrete Sidewalks and Driveways
02578	Solid Sodding
02660	Potable Water System

DIVISION 03 - CONCRETE

<u>Section</u>	<u>Title</u>
03600	Grouting

DIVISION 15 - MECHANICAL

<u>Section</u>	<u>Title</u>
15062	Ductile Iron Pipe & Fittings
15100	Ancillary Equipment
15111	Gate Valves

APPENDIX

Appendix A	Geotech Report
Appendix B	Easement Sketches
Appendix C	Permit Obtained by the County
Appendix D	List of Approved Materials

SECTION 01001
GENERAL WORK REQUIREMENTS

1
2
3
4
5
6 **PART 1 - GENERAL 3**

7 1.01 NOTICE AND SERVICE 3

8 1.02 WORK TO BE DONE 3

9 1.03 DRAWINGS AND PROJECT MANUAL..... 3

10 1.04 PROTECTION AND RESTORATION..... 4

11 1.05 PUBLIC NUISANCE..... 5

12 1.06 CONTRACTOR’S PAYMENTS TO COUNTY FOR OVERTIME WORK 5

13 1.07 MAINTENANCE OF SERVICE 6

14 1.08 TRANSFER OF SERVICE 6

15 1.09 LABOR..... 6

16 1.10 MATERIALS AND EQUIPMENT 7

17 1.11 MANUFACTURER'S SERVICE 7

18 1.12 INSPECTION AND TESTING..... 8

19 1.13 PROJECT SITE AND ACCESS 10

20 1.14 UTILITIES 11

21 1.15 RELATED CONSTRUCTION REQUIREMENTS 14

22 1.16 CONSTRUCTION NOT PERMITTED..... 17

23 **PART 2 - PRODUCTS (NOT USED) 17**

24 **PART 3 - EXECUTION (NOT USED) 17**

25
26
27

1
2
3
4
5
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7
8
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1 C. All schedules are given for the convenience of the County and the Contractor and are not
2 guaranteed to be complete. The Contractor shall assume all responsibility for the making
3 of estimates of the size, kind, and quantity of materials and equipment included in the
4 Work to be done under this Contract.

5 D. Intent:

- 6 1. All Work called for in the Specifications applicable to this Contract, but not shown on
7 the Drawings in their present form, or vice versa, shall be of like effect as if shown or
8 mentioned in both. Work not specified either in the Drawings or in the
9 Specifications, but involved in carrying out their intent or in the complete and proper
10 execution of the Work, is required and shall be performed by the Contractor as
11 though it were specifically delineated or described.
- 12 2. Items of material, equipment, machinery, and the like may be specified on the
13 Drawings and not in the Specifications. Such items shall be provided by the
14 Contractor in accordance with the specification on the Drawings.
- 15 3. The apparent silence of the Specifications as to any detail, or the apparent omission
16 from them of a detailed description concerning any Work to be done and materials to
17 be furnished, shall be regarded as meaning that only the best general practice is to
18 prevail and that only material and workmanship of the best quality is to be used, and
19 interpretation of these Specifications shall be made upon that basis.

20 E. Refer to the Contract for the order of precedence of items and documents.

21 1.04 PROTECTION AND RESTORATION

22 A. The Contractor shall be responsible for the preservation of all public and private property,
23 and shall use every means of protection necessary to prevent damage thereto. If any
24 direct or indirect damage is done to public or private property by or on account of any
25 act, omission, neglect, or misconduct in the execution of the Work on the part of the
26 Contractor, such property shall be restored by the Contractor, at his expense, to a
27 condition similar or equal to that existing before the damage was done, or the Contractor
28 shall make good the damage in other manner acceptable to the County/Professional.

29 B. Protection of Trees and Shrubs

- 30 1. Protect with boxes or other barricades.
31 2. Do not place excavated material so as to injure trees or shrubs.
32 3. Install pipelines in short tunnels between and under root systems.
33 4. Support trees to prevent root disturbance during nearby excavation.

34 C. Tree and Limb Removal

- 35 1. Tree limbs, which interfere with equipment operation and are approved for pruning,
36 shall be neatly trimmed and the tree cut coated with tree paint.
37 2. The County may order the Contractor, for the convenience of the County, to remove
38 trees along the line or trench excavation. The Contractor shall obtain any permits
39 required for removal of trees. Ordered tree removal shall be paid for under the
40 appropriate Contract Items.

- 1 D. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be
2 replaced by the Contractor with new stock of similar size and age, at the proper season
3 and at the sole expense of the Contractor.
- 4 E. Lawn Areas: All lawn areas disturbed by construction shall be replaced with like kind to
5 a condition similar or equal to that existing before construction. Where sod is to be
6 removed, it shall be carefully removed, and the same re-sodded, or the area where sod has
7 been removed shall be restored with new sod in the manner described in the applicable
8 section.
- 9 F. Where fencing, walls, shrubbery, grass strips or area must be removed or damaged
10 incident to the construction operation, the Contractor shall, after completion of the work,
11 replace or restore to the original condition.
- 12 G. The cost of all labor, materials, equipment, and work for restoration shall be deemed
13 included in the appropriate Contract Item or items, or if no specific item is provided
14 therefore, as part of the overhead cost of the Work, and no additional payment will be
15 made therefore.

16 1.05 PUBLIC NUISANCE

- 17 A. The Contractor shall not create a public nuisance including, but not limited to,
18 encroachment on adjacent lands, flooding of adjacent lands, or excessive noise.
- 19 B. Sound levels measured by the County/Professional shall not exceed 45 dBA from 8 p.m. to 8
20 a.m. or 55 dBA 8 a.m. to 8 p.m. This sound level shall be measured at the exterior of the
21 nearest exterior wall of the nearest residence. Levels at the equipment shall not exceed 85
22 dBA at any time. Sound levels in excess of these values are sufficient cause to have the
23 Work halted until equipment can be quieted to these levels. Work stoppage by the
24 County/Professional for excessive noise shall not relieve the Contractor of the other portions
25 of this specification including, but not limited to, completion dates and bid amounts.
- 26 C. No extra charge may be made for time lost due to work stoppage resulting from the
27 creation of a public nuisance.

28 1.06 CONTRACTOR'S PAYMENTS TO COUNTY FOR OVERTIME WORK

- 29 A. **County Inspector Work Hours: Normal work hours for the County's inspector(s)**
30 **are defined as any 8-hour period between the hours of 7:00 a.m. and 7:00 p.m. on**
31 **the weekdays of Monday through Friday. Any County Inspector(s) work beyond**
32 **the aforementioned normal work hours shall be requested in writing 48-hours in**
33 **advance. All overtime, any County holidays or weekend work compensation for the**
34 **County's Inspector(s) to work beyond the normal working hours are considered**
35 **overtime compensation and shall be paid for by the Contractor. The overtime pay**
36 **rate will be \$51.00 per hour or the most current rate as listed in the County Fee**
37 **Directory prepared by the Office of Management and Budget, in section "Orange**
38 **County Utilities Engineering & Construction", under the heading of "Inspection Fee**

1 **other than Normal Working Hours”. The Contractor agrees that the County shall**
2 **deduct charges for work outside normal work hours and for overtime pay from**
3 **payments due the Contractor.**

4 **B. No road Closures within 30 minutes before and after school drop hours.**

5 1.07 MAINTENANCE OF SERVICE

6 A. Unless noted otherwise on the plans, the operation of the existing water, reclaimed
7 water or wastewater facility on each of the respective locations shall remain in
8 service until the transfer of service has been completed. The Contractor shall, prior
9 to interrupting any utility service (water, sewer, etc.) for the purpose of making cut-
10 ins to the existing lines or for any other purposes, contact the County and make
11 arrangements for the interruption which will be satisfactory to the County.

12 B. Utility lines that are damaged during construction shall be repaired by the
13 Contractor and service restored within 4-hours of the breakage. The County retains
14 the option of repairing any damage to utility pipes in order to expedite service to the
15 customers. The Contractor will remain responsible for all costs associated with the
16 repair.

17 1.08 TRANSFER OF SERVICE

18 A. When the County has accepted a proposed facility and placed it into operation, the
19 transfer of service is complete. The Contractor may begin the work of removing the
20 existing or temporary facilities.

21 1.09 LABOR

22 A. Supervision: The Contractor shall supervise and direct the Work efficiently and with
23 his best skills and attention. The Contractor shall have a competent, English
24 speaking superintendent or representative, who shall be on the site of the Project at
25 all working hours, and who shall have full authority by the Contractor to direct the
26 performance of the Work and make arrangements for all necessary materials,
27 equipment, and labor without delay.

28 B. Jurisdictional Disputes: It shall be the responsibility of the Contractor to pay all
29 costs that may be required to perform any of the Work shown on the Drawings or
30 specified herein to avoid any work stoppages due to jurisdictional disputes. The
31 basis for subletting work in question, if any, shall conform to precedent agreements
32 and decisions on record with the Building and Construction Trades Department,
33 AFL-CIO, dated June, 1973, including any amendments thereto.

34 C. Apprenticeship: The Contractor shall comply with all of the requirements of Section
35 446, Florida Statutes, for all contracts in excess of \$25,000 excluding roadway,
36 highway or bridge contracts and the Contractor agrees to insert in any subcontract
37 under this Contract the requirements of this Article.

1 1.10 MATERIALS AND EQUIPMENT

2 A. MANUFACTURER

- 3 1. All transactions with the manufacturers or Subcontractors shall be through the
4 Contractor, unless the Contractor and the County/Professional request that the
5 manufacturer or Subcontractor communicate directly with the County/Professional.
6 Any such transactions shall not in any way release the Contractor from his full
7 responsibility under this Contract.
- 8 2. All workmanship and materials shall be of the highest quality. The equipment shall
9 be the product of manufacturers who are experienced and skilled in the field with an
10 established record of research and development. No equipment will be considered
11 unless the manufacturer has designed and manufactured equipment of comparable
12 type and size and have demonstrated sufficient experience in such design and
13 manufacture.
- 14 3. No material shall be delivered to the Site without prior approval of the
15 County/Professional.
- 16 4. All apparatus, mechanisms, equipment, machinery, and manufactured articles for
17 incorporation into the Project shall be the new (most current production at time of
18 bid) and unused standard products of recognized reputable manufacturers.
- 19 5. Manufactured and fabricated products:
- 20 a. Design, fabricate and assemble in accord with the best engineering and shop practices.
21 b. Manufacture like parts of duplicate units to standard sizes and gauges, to be
22 interchangeable.
- 23 c. Any two or more pieces of material or equipment of the same kind, type or
24 classification, and being used for identical types of service, shall be made by the
25 same manufacturer.
- 26 d. Products shall be suitable for service conditions as specified and as stated by
27 manufacturer.
- 28 e. Equipment capacities, sizes and dimensions shown or specified shall be adhered
29 to unless variations are specifically approved in writing.
- 30 f. Do not use material or equipment for any purpose other than that for which it is
31 designed or is specified.

32 1.11 MANUFACTURER'S SERVICE

- 33 A. Where service by the manufacturer is specified to be furnished as part of the cost of the
34 item of equipment, the Work shall be at the Contractor's expense.
- 35 B. The services provided shall be by a qualified manufacturer's service representative to
36 check and verify the completed installation, place the equipment in operation, and
37 instruct the County's operators in the operation and maintenance procedures. Such
38 services are to be for period of time and for the number of trips specified. A working day
39 is defined as a normal 8-hour working day on the job and does not include travel time.
- 40 C. The services shall further demonstrate to the County/Professional's complete satisfaction
41 that the equipment will satisfactorily perform the functions for which it has been
42 installed.

1 1.12 INSPECTION AND TESTING

2 A. General

- 3 1. All materials and equipment furnished by the Contractor shall be subject to the
4 inspection, review and acceptance of the County and meet the requirements as
5 outlined in the Orange County Utilities Standards and Construction Specifications
6 Manual. If in the testing of any material or equipment it is ascertained by the
7 County/Professional that the material or equipment does not comply with the
8 Contract, the Contractor shall be notified thereof, and the Contractor will be directed
9 to refrain from delivering said material or equipment, or to remove it promptly from
10 the Site or from the Work and not accepted by the County shall be replaced with
11 acceptable material, without cost to the County.
- 12 2. Tests of electrical and mechanical equipment and appliances shall be conducted in
13 accordance with recognized test codes of the ANSI, ASME, or the IEE, except as
14 may otherwise be stated herein.
- 15 3. The Contractor shall give notice in writing to the County sufficiently in advance of
16 his intention to commence the manufacture or preparation of materials especially
17 manufactured or prepared for use in or as part of the permanent construction. Such
18 notice shall contain a request for inspection, the date of commencement and the
19 expected date of completion of the manufacture or preparation of materials. Upon
20 receipt of such notice, the County shall arrange to have a representative present at
21 such times during the manufacture as may be necessary to inspect the materials; or
22 the County will notify the Contractor that the inspection will be made at a point other
23 than the point of manufacture; or the County will notify the Contractor that inspection
24 will be waived.
- 25 4. When inspection is waived or when the County/Professional so requires, the
26 Contractor shall furnish to the County authoritative evidence in the form of
27 Certificates of Manufacture that the materials to be used in the Work have been
28 manufactured and tested in conformity with the Contract Documents. These
29 certificates shall be notarized and shall include five (5) copies of the results of
30 physical tests and chemical analysis, where necessary, that have been made directly
31 on the product or on similar products of the manufacturer.
- 32 5. The Contractor must comply with these provisions before shipping any material.
33 Such inspections by the County shall not release the Contractor from the
34 responsibility for furnishing materials meeting the requirements of the Contract
35 Documents.

36 B. Cost

- 37 1. County shall employ and pay for the services of an independent testing laboratory to
38 perform testing indicated on the Contract Documents, or at the County's discretion to
39 ensure conformity with the Contract Documents.
- 40 2. The cost of field leakage and pressure tests and shop tests of materials and equipment
41 specifically called for in the Contract Documents shall be borne by the Contractor.
42 Such costs shall be deemed to be included in the Contract price.
- 43 3. The Contractor shall notify the County laboratory a minimum of 48-hours in advance
44 of operations for scheduling of tests. When tests or inspections cannot be performed
45 after such notice, the Contractor shall reimburse County for expenses incurred.

- 1 4. The Contractor shall pay for all work required to uncover, remove, replace, retest,
2 etc., any work not tested due to the Contractor's failure to provide the 48-hours
3 advance notice or due to failed tests. The Contractor shall also provide compensation
4 for the County/Professional's personnel for required re-testing due to failed or
5 rescheduled testing.

6 C. Shop Testing

- 7 1. Each piece of equipment for which pressure, duty, capacity, rating, efficiency,
8 performance, function or special requirements are specified shall be tested in the shop
9 of the manufacturer in a manner which shall conclusively prove that its characteristics
10 comply fully with the requirements of the Contract Documents. No such equipment
11 shall be shipped to the worksite until the County/Professional notifies the Contractor,
12 in writing, that the results of such tests are acceptable.
- 13 2. The manufacturing company shall provide five (5) copies of the manufacturer's actual
14 shop test data and interpreted results signed by a responsible official of the
15 manufacturing company and notarized, showing conformity with the Contract
16 Documents as a prerequisite for the acceptance of any equipment. The cost of shop
17 tests (excluding cost of County's representative) and of furnishing manufacturer's
18 preliminary and shop test data of operating equipment shall be borne by the
19 Contractor and shall be included in the Contract price.

20 D. Field Testing:

- 21 1. The County shall employ and pay for services of an independent testing laboratory to
22 perform testing specifically indicated in the Contract Documents. Employment of the
23 laboratory shall in no way relieve Contractor's obligations to perform the Work of the
24 Contract. The Contractor shall provide compensation for retesting of all failed tests.
- 25 2. The County may at any time during the progress of the Work, request additional
26 testing beyond that which is specified in the Contract. This testing will be at the
27 County's expense. Contractor shall:
- 28 a. Cooperate with laboratory personnel, provide access to the Project.
29 b. Secure and deliver to the laboratory adequate quantities of representative samples
30 of materials proposed to be used and which require testing.
31 c. Provide to the laboratory the preliminary design mix proposed to be used for
32 concrete, and other material mixes, which require control by the testing laboratory.

33 E. Demonstration Tests: Upon completion of the Work and prior to final payment, all
34 equipment and piping installed under this Contract shall be subjected to acceptance or
35 demonstration tests as specified or required to provide compliance with the Contract
36 Documents. The Contractor shall furnish all labor, fuel, energy, water and all other
37 equipment necessary for the demonstration tests at no additional cost to the County.

38 F. Final Inspection: Prior to preparation of the final payment application, a final inspection
39 will be performed by the County to determine if the Work is properly and satisfactorily
40 constructed in accordance with the requirements of the Contract Documents. See also
41 Section 01700 "Project Closeout."

1 G. Inspection by existing utility owners: The Contractor shall pay for all inspections during
2 the progress of the work required and provided by the owner of all existing public
3 utilities paralleling or crossing the Work, as shown on the Drawings. All such inspection
4 fees shall be deemed included in the appropriate Contract Item or items, or if no specific
5 item is provided therefore, as part of the overhead cost of the Work, and no additional
6 payment will be made therefore.

7 H. Inspection by Other Agencies: The Florida Department of Transportation, the Florida
8 Department of Environmental Protection, and other authorized governmental agencies
9 shall have free access to the site for inspecting materials and work, and the Contractor
10 shall afford them all necessary facilities and assistance for doing so. Any instructions to
11 the Contractor resulting from these inspections shall be given through the County. These
12 rights of inspections shall not be construed to create any contractual relationship between
13 the Contractor and these agencies.

14 1.13 PROJECT SITE AND ACCESS

15 A. RIGHT-OF-WAY AND EASEMENTS

- 16 1. The use of public streets and alleys shall be such as to provide a minimum of
17 inconvenience to the public and to other traffic. Any earth or other excavated
18 material shall be removed by the Contractor and the streets cleaned to the satisfaction
19 of the County.
- 20 2. The Contractor shall not enter or occupy private land outside of easements, except by
21 written permission of the property owner.
- 22 3. At the time of the Pre-Construction meetings, the Contractor shall become fully
23 acquainted with the status of all easements. Should easements not be acquired by the
24 County in specific areas of the Work, the Contractor shall sequence and schedule his
25 work therein so as not to interfere with the progress of work in other areas of the
26 Project. Any rescheduling of work due to easement acquisitions shall be performed
27 by the Contractor at no additional cost to the County. The County agrees that it will
28 make every effort to acquire all remaining easements with all speed and diligence
29 possible so as to allow the completion of the Work within the Contract time.

30 B. ACCESS

- 31 1. Neither the material excavated nor the materials or equipment used in the
32 construction of the Work shall be so placed as to prevent free access to all fire
33 hydrants, valves or manholes.
- 34 2. Access to businesses located adjacent to the project site must be maintained at all
35 times. Contractor may prearrange the closing of business access with the business
36 Owner. Such prearranged access closing shall not exceed two (2) hours. Property
37 drainage and grading shall be restored and all construction debris removed within 48-
38 hours of backfilling trench.
- 39 3. Contractor agrees that representatives of the County and any governmental agents
40 will have access to the Work wherever it is in preparation or progress and that the
41 Contractor shall provide facilities for such access and inspection.

1 1.14 UTILITIES

2 A. UTILITY CONSTRUCTION

3 1. Public utility installations and structures shall be understood to include all poles,
4 tracks, pipes, wires, conduits, house service connections, vaults, manholes and all
5 other appurtenances and facilities pertaining thereto, whether owned or controlled by
6 governmental bodies or privately owned by individuals, firms or corporations, used to
7 serve the public with transportation, traffic control, gas, electricity, telephone,
8 sewerage, drainage or water. Other public or private property, which may be affected
9 by the Work, shall be deemed included hereunder.

10 2. All open excavations shall be adequately safeguarded by providing temporary
11 barricades, caution signs, lights and other means. The Contractor shall, at his own
12 expense, provide suitable and safe bridges and other crossings for accommodating
13 travel by pedestrians and workmen. Bridges provided for access to private property
14 during construction shall be removed when no longer required.

15 3. The length of open trench will be controlled by the particular surrounding conditions,
16 but shall always be confined to the limits described by the County. If any excavation
17 becomes a hazard, or if it excessively restricts traffic at any point, the County may
18 require special construction procedures. As a minimum, the Contractor shall conform
19 to the following restoration procedures:

20 a. Interim Restoration: All excavations shall be backfilled and compacted as
21 specified by the end of each working day. For excavations within existing paved
22 areas; limerock base or soil cement base (match existing) shall be spread and
23 compacted to provide a relatively smooth surface free of loose aggregate material.
24 At the end of each workweek, the S-I asphaltic surface course shall be completed
25 and opened to traffic. Contractor shall coordinate his construction activity
26 including density tests and inspections to allow sufficient time to achieve this
27 requirement. All driveway cuts shall be backfilled, compacted, and limerock base
28 spread and compacted immediately after installation. Contractor shall coordinate
29 with the individual property owners prior to removing the driveway section. Any
30 utility crossing an existing roadway, parking lot or other paved area shall be
31 patched by the end of the working day.

32 b. All pipe and fittings shall be neatly stored in a location, which will cause the least
33 disturbance to the public. All debris shall be removed and properly disposed of
34 by the end of each working day.

35 c. Final Restoration Overlay: After completing all installations, and after testing of
36 the pipe (but no sooner than 30-days after applying the S-I asphaltic surface), final
37 restoration shall be performed. In no event shall final restoration begin after
38 substantial completion. Final restoration shall provide an S-III asphaltic overlay
39 as specified in an uninterrupted continuous operation until completion. Any
40 additional restoration required after testing shall be repaired in a timely manner at
41 no additional cost to the County.

42 d. Maintenance of all restored facilities shall be the Contractor's responsibility. This
43 maintenance shall be performed on an on-going basis during the course of
44 construction. The Contractor's Progress Schedule shall reflect the above
45 restoration requirements.

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

8 **B. EXISTING UTILITIES**

- 9 1. The locations of all existing underground piping, structures and other facilities are
10 shown based on information received from the respective owner. The locations are
11 shown without express or implied representation, assurance, or guarantee that they
12 are complete or correct or that they represent a true picture of underground piping,
13 conduit and cables to be encountered. It is the Contractor's responsibility to verify all
14 existing underground piping, structures and other facilities.
- 15 2. The Contractor shall, at all times, employ acceptable methods and exercise reasonable
16 care and skill so as to avoid unnecessary delay, injury, damage or destruction of
17 existing utility installations and structures; and shall, at all times in the performance
18 of the Work, avoid unnecessary interference with, or interruption of, utility services;
19 and shall cooperate fully with the owners thereof to that end.
- 20 3. When existing facilities are found to be in conflict with the Work, the County
21 reserves the right to modify alignments to avoid interference with existing facilities.
- 22 4. All utilities, which do not interfere with the work, shall be carefully protected against
23 damage. Any existing utilities damaged in any way by the Contractor shall be
24 restored or replaced by the Contractor at his expense as directed by the County. Any
25 existing facilities, which require operation to facilitate repairs, shall be operated only
26 by the owner of the respective utility.
- 27 5. It is the responsibility of the Contractor to ensure that all utility and/or poles, the
28 stability of which may be endangered by the proximity of excavation, be temporarily
29 stayed and/or shored in position while work proceeds in the vicinity of the pole and
30 that the utility or other companies concerned be given reasonable advance notice of
31 any such excavation.

32 **C. NOTICES**

- 33 1. All governmental utility departments and other owners of public utilities, which may
34 be affected by the Work, will be informed in writing by the Contractor two (2) weeks
35 after the execution of the Contract or Contracts covering the Work. Such notice will
36 be sent out in general, and directed to the attention of the governmental utility
37 departments and other owners of public utilities for such installations and structures
38 as may be affected by the Work.
- 39 2. The Contractor shall comply with Florida Statute 553.851 regarding protection of
40 underground gas pipelines. Evidence of notification to the gas pipeline owner shall
41 be furnished to the County within two (2) weeks after the execution of the Contract.
- 42 3. It shall be the Contractor's responsibility to contact utility companies at least 72-hours
43 in advance of breaking ground in any area or on any unit of the work so maintenance
44 personnel can locate and protect facilities, if required by the utility company.

- 1 4. The Contractor shall give a minimum five (5) working day notice to utility personnel
2 prior to interrupting a utility service (water, sewer, etc.).

3 D. EXPLORATORY EXCAVATIONS

- 4 1. Exploratory excavations shall be conducted by the Contractor for the purpose of
5 locating underground pipelines or structures in advance of the construction. Test pits
6 shall be excavated in areas of potential conflicts between existing and proposed
7 facilities and at piping connections to existing facilities a minimum of 48-hours or
8 1,000-feet in advance of work. If there is a potential conflict, the Contractor shall
9 notify the County/Professional immediately. Information on the obstruction to be
10 furnished by the Contractor shall include: Location, Elevation, Utility Type, Material
11 and Size. Test pits shall be backfilled immediately after their purpose has been
12 satisfied and the surface restored and maintained in a manner satisfactory to the
13 County.

14 E. UTILITY CROSSINGS

- 15 1. It is intended that wherever existing utilities must be crossed, deflection of the pipe
16 within specified limits and cover shall be used to satisfactorily clear the obstruction
17 unless otherwise indicated on the Drawings. However, when in the opinion of the
18 County this procedure is not feasible, the County may direct the use of fittings for a
19 utility crossing or conflict transition as detailed on the Drawings.

20 F. RELOCATIONS

- 21 1. Relocations shown on the Drawings: Public utility installations or structures,
22 including but not limited to poles, signs, fences, piping, conduits and drains that
23 interfere with the positioning of the work which are shown on the Drawings to be
24 removed, relocated, replaced or rebuilt by the Contractor shall be considered as part
25 of the general cost of doing the Work and shall be included in the prices bid for the
26 various contract items. No separate payment shall be made therefore.
- 27 2. Relocations not shown on the Drawings
- 28 a. Where public utility installations or structures are encountered during the course
29 of the work, and are not indicated on the Drawings or in the Specifications, and
30 when, in the opinion of the County, removal, relocation, replacement or
31 rebuilding is necessary to complete the Work, such work shall be accomplished
32 by the utility having jurisdiction, or such work may be ordered, in writing by the
33 County, for the Contractor to accomplish.
- 34 b. If such work is accomplished by the utility having jurisdiction, it will be carried
35 out expeditiously and the Contractor shall give full cooperation to permit the
36 utility to complete the removal, relocation, replacement or rebuilding as required.
- 37 c. If such work is accomplished by the Contractor, it will be paid for as a Change
38 Order.
- 39 3. All existing castings, including valve boxes, junction boxes, manholes, hand holes,
40 pull boxes, inlets and similar structures in the areas of construction that are to remain
41 in service and in areas of trench restoration and pavement replacement, shall be
42 adjusted by the Contractor to bring them flush with the surface of the finished work.

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

5 1.15 RELATED CONSTRUCTION REQUIREMENTS

6 A. PUBLIC INFORMATION OFFICER

- 7 1. The Contractor shall provide community interaction and coordination through a
8 designated Public Information Officer (PIO). The PIO will provide resolution to
9 complaints and problems from community members affected by the construction for
10 the entire project duration. The PIO will manage a 24-hour hotline phone number for
11 citizens to call. The PIO will field these calls, provide answers to questions, research
12 issues with the project team or appropriate agencies and follow up each complaint in
13 a timely manner. The PIO will maintain a daily diary of call and/or interactions with
14 the community, as well as a complaint log chronicling all issues and proposed
15 resolutions.
16 2. The PIO shall attend the project progress meetings and provide the project team with
17 a report of public issues since the last progress meeting. The PIO will also
18 disseminate roadway closures, sewer hookups, temporary and permanent restoration
19 and other relevant construction information to the community, as well as, when
20 appropriate, to the media, emergency services personnel and other interested
21 agencies.
22 3. The designated PIO shall have previous experience in providing similar services on
23 Orange County Utilities, Orange County Public Works or FDOT construction
24 projects. The PIO shall be fluent in English and Spanish and shall visit the
25 construction site, meeting locations and affected resident's homes as required.

26 B. TRAFFIC MAINTENANCE

- 27 1. Refer to Section 01570 – Maintenance of Traffic

28 C. BARRIER AND LIGHTS

- 29 1. The Contractor shall exercise extreme care in the conduct of the Work to protect
30 health and safety of the workmen and the public. The Contractor shall provide all
31 protective measures and devices necessary, in conformance with applicable local,
32 state and federal regulations. Protective measures shall include but are not limited to
33 barricades, warning lights/flashers and safety ropes.
34 2. All equipment and vehicles operating within 10-feet of the roadway shall have
35 flashing strobe lights attached.

36 D. DEWATERING AND FLOTATION

- 37 1. The Contractor, with his own equipment, shall do all pumping necessary to dewater
38 any part of the work area during construction operations to insure dry working
39 conditions. The Contractor shall take the necessary steps to protect on-site and off-
40 site structures. Damage to any structures due to dewatering shall be repaired or the
41 structures replaced at the Contractor's expense.
42 2. The Contractor shall be completely responsible for any tanks, wetwells or similar

1 structures that may become buoyant during the construction and modification
2 operations due to the ground water or floods and before the structure is put into
3 operation. The proposed final structures have been designed to account for
4 buoyancy; however the Contractor may employ methods, means and techniques
5 during construction which may affect the buoyancy of structures. The Contractor
6 shall take the necessary steps to protect structures. Damage to any structures due to
7 floating or flooding shall be repaired or the structures replaced at the Contractor's
8 expense.

- 9 3. Contractor shall be responsible for any required permits for the discharge of ground
10 water.

11 E. DUST AND EROSION CONTROL

- 12 1. The Contractor shall prevent dust nuisance from his operations or from traffic.
13 2. Contractor is responsible for providing effective temporary erosion and sediment
14 control measures during construction or until final controls become effective.
15 3. Temporary erosion controls include, but are not limited to, grassing, mulching,
16 netting, watering and reseeding on-site surfaces and soil and borrow area surfaces and
17 providing interceptor ditches at ends of berms and at those locations which will
18 ensure that erosion during construction will be either eliminated or maintained within
19 acceptable limits as established by the County, FDEP and any other agency having
20 jurisdiction.
21 4. Temporary sedimentation controls include, but are not limited to; silt dams, traps,
22 barriers, and appurtenances at the foot of sloped surfaces which will ensure that
23 sedimentation pollution will be either eliminated or maintained within acceptable
24 limits as established by the County, FDEP and any other agency having jurisdiction.
25 5. The construction of temporary erosion and sedimentation control facilities shall be in
26 accordance with the technical provision of section 104 "Prevention, Control, and
27 Abatement of Erosion and Water Pollution" of the FDOT Standard Specifications for
28 Road and Bridge Construction, latest edition.

29 F. LINES AND GRADES

- 30 1. All Work under this Contract shall be constructed in accordance with the lines and
31 grades shown on the Drawings, or as given by the County/Professional.
32 2. When the location of the Work is dimensioned on the Drawings, it shall be installed in
33 that location; when the location of the Work is shown on a scaled drawing, without
34 dimensions, the Work shall be installed in the scaled location unless the County approves
35 an alternate location for the piping. Where fittings are noted on the Drawings, such
36 notation is for the Contractor's convenience and does not relieve the Contractor from
37 laying and jointing different or additional items where required. The County/Professional
38 may require detailed pipe laying drawings and schedules for project control.
39 3. The Contractor shall, at his own expense, establish all working or construction lines
40 and grades as required from the project control points set by the County, and shall be
41 solely responsible for the accuracy thereof.
42 4. Water main and forcemain shall be installed to provide long uniform gradient or slope
43 to pipe to minimize air pockets and air release valves. The stationing shown on the
44 Drawings for air and vacuum release valve assemblies are approximate and the
45 Contractor shall field adjust these locations to locate these valves at the highest point

- 1 in the pipeline installed. All locations must be accepted by the County.
2 5. To insure a uniform gradient for gravity pipe and pressure pipe, all lines shall be
3 installed using the following control techniques as a minimum:
4 a. Gravity lines; continuous control, using laser beam technology.
5 b. Pressure lines; control stakes set at 50-foot intervals using surveyors' level
6 instrument.

7 G. TEMPORARY CONSTRUCTION

- 8 1. Temporary fences: If, during the course of the Work, it is necessary to remove or
9 disturb any fencing, the Contractor shall at his own expense, provide a suitable
10 temporary fence which shall be maintained until the permanent fence is replaced.
11 2. Responsibility for Temporary Structures: In accepting the Contract, the Contractor
12 assumes full responsibility for the sufficiency and safety of all temporary structures or
13 work and for any damage which may result from their failure or their improper
14 construction, maintenance or operation.

15 H. DAILY REPORTS

- 16 1. The Contractor shall submit to the County's Representative daily reports of
17 construction activities including non-work days. The reports shall be complete in
18 detail and shall include the following information:
19 a. Days from Notice to Proceed; Days remaining to substantial and final completion.
20 b. Weather information
21 c. Work activities with reference to the Critical Path Method (CPM) schedule
22 activity numbers (including manpower, equipment and daily production quantities
23 for each individual activity).
24 d. Major deliveries
25 e. Visitors to site
26 f. Test records
27 g. New problems, and
28 h. Other pertinent information
29 2. A similar report shall be submitted for/by each Subcontractor.
30 3. The report(s) shall be submitted to the County Representative within 2 days of the
31 respective report date. Each report shall be signed by the Contractor's Superintendent
32 or Project Manager. Pay request will not be processed unless daily reports are
33 current.
34 4. If a report is incomplete, in error, or contains misinformation, a copy of the report
35 shall be returned by the County Representative to the Contractor's Superintendent or
36 Project Manager with corrections noted. When chronic errors or omissions occur, the
37 Contractor shall correct the procedures by which the reports are produced.

38 I. CLEANING

- 39 1. During Construction
40 a. During construction of the Work, the Contractor shall, at all times, keep the Site
41 free from material, debris and rubbish as practicable and shall remove the same
42 from any portion of the Site if, in the opinion of the County, such material, debris,
43 or rubbish constitutes a nuisance or is objectionable.

- 1 b. Provide on-site containers for the collection of waste materials, debris and rubbish
- 2 and remove such from the Site periodically by disposal at a legal disposal area
- 3 away from the Site.
- 4 c. Clean interior spaces prior to the start of finish painting and continue cleaning on
- 5 an as-needed basis until painting is finished. Use cleaning materials which will
- 6 not create hazards to health or property and which will not damage surfaces. Use
- 7 only those cleaning materials and methods recommended by the manufacturer of
- 8 the surface material. Schedule operations so that dust and other contaminants
- 9 resulting from cleaning process will not fall on wet or newly coated surfaces.
- 10 d. The Contractor shall remove from the site all surplus materials and temporary
- 11 structures when no longer necessary to the Work at the direction of the County.
- 12 2. Final Cleaning
- 13 a. At the conclusion of the Work, all equipment, tools, temporary structures and
- 14 materials belonging to the Contractor shall be promptly taken away, and the
- 15 Contractor shall remove and promptly dispose of all water, dirt, rubbish or any
- 16 other foreign substances. Employ skilled workmen for final cleaning.
- 17 Thoroughly clean all installed equipment and materials to a bright, clean, polished
- 18 and new appearing condition. Remove grease, mastic, adhesives, dust, dirt,
- 19 stains, fingerprints, labels, and other foreign materials from sight-exposed interior
- 20 and exterior surfaces. Broom clean exterior paved surfaces; rake clean other
- 21 surfaces of the grounds.
- 22 b. The Work shall be left in a condition as shown on the Drawings and the
- 23 remainder of the site shall be restored to a condition equal or better than what
- 24 existed before the Work.
- 25 c. Prior to final completion, or County occupancy, Contractor shall conduct an
- 26 inspection of interior and exterior surfaces, and all work areas to verify that the
- 27 entire Work is clean. The County will determine if the final cleaning is
- 28 acceptable.

29 1.16 CONSTRUCTION NOT PERMITTED

30 A. USE OF EXPLOSIVES

- 31 1. No blasting shall be done except as approved by the County and the governmental
- 32 agency or political subdivision having jurisdiction.

33 **PART 2 - PRODUCTS (NOT USED)**

34 **PART 3 - EXECUTION (NOT USED)**

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END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This Contract is for the Summerport Village WM as shown on the Drawings and specified herein. The Work consists of furnishing all labor, equipment, and materials for the construction of the facilities consisting of, but not limited to the expansion of or improvements to the equipment and structures associated with the following:

1. Furnish and installing approximately 1,240 linear feet of 24-inch diameter potable water main and associated appurtenances.
2. Placing out of service a 24-inch diameter potable water main, removing/disposing approximately 440 linear feet of 24-inch piping and associated appurtenances and abandoning in place approximately 640 linear feet of 24-inch piping.
3. Excavation, backfill and compaction of underground utilities.
4. Temporary dewatering and discharge of water to accommodate construction.
5. Maintenance of traffic necessary to complete the work.
6. Removal and replacement of pavement, curbs, and sidewalks as applicable.
7. Support and protection of existing utilities during construction.
8. Disinfection, testing and cleaning of installed systems.
9. Restoration and site clean-up.

B. The Contractor shall furnish all labor, equipment, tools, services and incidentals to complete all Work required by these Specifications and as shown on the Drawings and shall have experience with water main replacement in an existing subdivision.

C. The Contractor shall perform the Work complete, in place, and ready for continuous service, and shall include repairs, testing, permits, cleanup, replacements and restoration required as a result of disruption or damages caused during this Construction.

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

E. The Contractor shall comply with all Municipal, County, State, Federal, and other codes which are applicable to this Project.

1.02 CONTRACTOR'S USE OF PREMISES

A. The Contractor shall assume full responsibility for the protection and safekeeping of

1 products and materials at the job site. If additional storage or work areas are required,
2 they shall be obtained by the Contractor at no additional cost to the Owner.

3 1.03 SUGGESTED SEQUENCE OF WORK

4 A. The Contractor shall establish his work sequence based on the use of crews to facilitate
5 completion of construction and testing within the specified Contract Time.

6 B. The Contractor shall submit a schedule and work sequence to the Owner at least five (5)
7 days prior to the Notice to Proceed. Work on all utility lines shall be accomplished so
8 that all facilities will stay in operation.

9 C. The Contractor shall install the 24-inch diameter potable water main and associated
10 appurtenances in the easement portion.

11 D. The Contractor shall remove the existing 24-inch diameter potable water main in the
12 section between the easement portion and Winter Garden Vineland Road.

13 E. The Contractor shall install the 24-inch diameter potable water main and appurtenances
14 in the section between the easement portion and Winter Garden Vineland Road.
15

16 1.04 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES

17 A. Some of the utility contacts are listed on the plans for the Contractor's convenience.

18 **PART 2 - PRODUCTS (NOT USED)**

19 **PART 3 - EXECUTION (NOT USED)**

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END OF SECTION

SECTION 01021
SOILS REPORT AND OTHER INFORMATION

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Identification of reports of existing conditions.

Bidder's/Contractor's responsibilities for investigating and working with existing conditions.

1.02 LAND IN-ADDITION TO THE SITE

- A. Contractor is responsible for obtaining any lands, areas, properties, facilities and easements, in addition to those furnished by the County, that the Contractor considers necessary for temporary facilities, storage, disposal of spoil or waste material or other purposes the Contractor determines necessary to complete the Work. Contractor shall provide written documentation from owner to use such land or facilities. The County/Professional and the Geotech do not assume any responsibility for existing conditions at such lands, areas, properties, facilities and /or easements obtained by the Contractor.

1.03 SUBSURFACE CONDITIONS AND OTHER PHYSICAL CONDITIONS

- A. This Section identifies reports of explorations and tests of subsurface conditions, and drawings of physical conditions of existing surface and subsurface structures that have been used in the preparation of the Contract Documents. Contractor may rely upon any technical information and data in those reports found in Appendix A, "Geotechnical Report (includes geotechnical investigation and dewatering ground water quality values per Chapter 62-621, paragraph 62-621.300(2), F.A.C.)." The Report(s) in Appendix A is designated as Authorized Technical Data, but those reports and drawings are not part of the Contract Documents.
- B. Any conclusions or interpretations made by the Contractor based on any Authorized Technical Data will be at the Contractor's own risk. Contractor's reliance on any non-technical information, data, interpretations or opinions also will also be at Contractor's own risk. The County/Professional assume no responsibility for any understanding reached or representation made about subsurface conditions and physical conditions of existing structures, except as otherwise expressly shown in or represented by the Authorized Technical Data provided.
- C. The only information or data contained in the geotechnical report and used in the preparation of the Contract Documents that may be properly considered authorized technical data concerning subsurface conditions is found in Appendix A "Geotechnical Report". Such technical data are made available to allow the Contractor to have access to the same information available to the County. The County/Professional do not warrant the accuracy or completeness of any such information or that the Contract Documents identify all the existing relevant reports and/or documents.

1.04 UNDERGROUND UTILITIES

- A. Information or data about physical conditions of Underground Utilities, which have been used in the preparation of the Contract Documents, is shown or indicated in the Drawings and technical specifications. Such information and data is based on information and data obtained from record documents or furnished to the County by the owners of those Underground Utilities or by others.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 EXISTING GROUND SURFACE AND UNDERGROUND CONDITIONS; GENERALLY

- A. Where existing ground conditions are shown on the plans hereto attached, the elevations are believed to be reasonably correct but are not guaranteed to be absolutely so, and, together with any schedule of quantities, are presented only as an approximation. The Contractor shall satisfy itself, however, by actual examination of the site of the Work, as to the existing elevations and the amount of work required under the Contract.
- B. Where test pits and borings have been dug, the results supplied to the County/Professional by the soils Engineer may be given on the plans or are on file in the County/Professional's office and available for review . The County does not guarantee the accuracy or correctness of this information. If the Contractor desires any additional information relating to the soils investigation, contact the County/Professional to obtain such information. County does not guarantee the accuracy or correctness of any such information supplied to the Contractor.
- C. If, upon notice of a differing subsurface or latent physical condition from the Contractor, the County determines there was no unforeseen condition and unnecessary tests and investigations were conducted solely at the Contractor's request, any unnecessary expenses may be deducted from the Final Payment for the Contract. No increase in Contract Amount or Contract Time will be made if the differing site conditions were known or could have been discovered by the types of examinations that the Contractor, as Bidder, was responsible for. Claims based on groundwater table conditions will not be considered unforeseen subsurface conditions and will not be allowed. Any information indicated in the Contract Documents as to the groundwater table conditions has been provided for general information purposes only and is not intended to represent that the same conditions will exist during the execution of the Work. Further, no increase in Contract Amount or Contract Time will be made for costs incurred prior to the Contractor's written notice as required by the Contract Documents. The County will be allowed at least 10-days to investigate any alleged differing site conditions and to take appropriate action, before the Contractor is entitled to any adjustment in Contract Amount or Contract Time for Delay.

3.02 UNDERGROUND UTILITIES:

- A. The Contractor will be responsible for the safety and protection of, and providing for the repair of any damage done to the Work and existing surface and subsurface structures. The Contractor will be responsible for any damages and injury resulting from the failure to excavate in a careful and prudent manner.
- B. Contractor shall have full responsibility for locating all underground pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities, including those that convey electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, water, wastewater, stormwater, other liquids or chemicals, or traffic or other control systems, shown or indicated in the Contract Documents, in advance of construction, coordinating the Work with the actual locations found and making note of the actual locations on the record Drawings. Contractor shall exercise extreme caution when locating underground facilities to minimize the risk of damage from Contractor's activities. The Contractor will immediately notify the County and the owner of any Underground Utilities that are inaccurately identified or located on the Drawings.
- C. The Contractor will be responsible for any delay and all costs relating to the obligations set forth in this Section, except as provided by allowances specific to Underground Utilities.
- D. The Contractor will promptly notify the County, in writing, whenever the Contractor discovers that actual physical conditions of Underground Utilities differ materially from those indicated by the Contract Documents or Authorized Technical Data provided with the Contract Documents. Further, the Contractor promptly will notify the County, in writing, whenever the Contractor encounters Underground Utilities not shown or indicated in/through the Contract Documents, and which could not reasonably have been foreseen.
- E. The County and Contractor will follow the provisions of the General Conditions with respect to any conclusions reached by the County after the County compares the actual underground utility conditions with those included in the information provided to the Contractor.

3.03 ENVIRONMENTAL PROCEDURES FOR HAZARDOUS MATERIALS

- A. The Contractor will not, at any time, cause or permit any Hazardous Materials to be brought upon, stored, manufactured, blended, handled, or used in, on, or about the Project or the Site for any purpose except as lawful and necessary and in accordance with the Contract Documents. The Contractor will not cause or permit Hazardous Materials to be brought on Site unless they have been specifically pre-identified by the Contractor, and approved in writing in advance by the County.
- B. The Contractor will defend, save, indemnify and hold harmless the County, their agents and employees from and against all liabilities, claims, damages, losses and expenses including attorneys' fees, which arise at any time during or after completion of the Work as a result of or in connection with:
 - 1. The Contractor's breach of any prohibition or requirement set forth in this Section or,

2. Any Hazardous Materials discharged, released, deposited or introduced in the soil or surface or groundwater in, on, under, or about the Work, the Site or other properties as a result of the activities of the Contractor, the Subcontractors and their respective agents and employees in connection with the Work.
- C. This Contractor's indemnity obligation includes without limitation, costs incurred in connection with any investigation of site conditions or any cleanup, remediation, removal, or restoration required by the County or any federal, State, or local Public Agency because of:
1. The occurrence of any Hazardous Materials present in the soil or surface or groundwater in, on, under, or about the Work or the Site;
 2. The diminution in value of the Work or the Site;
 3. Damages for the loss or restriction on use of the Work or of any amenity of the Work or the Property; and/or
 4. Amounts paid in settlement of claims, penalties, attorneys' fees, court costs, consultant and laboratory fees and experts' fees.
- D. The Contractor will immediately notify the County in writing of any significant release of Hazardous Materials at the Project or the Site, specifying the nature and quantity of the release, the location of the release, and the measures taken to contain and clean up the release and ensure that future releases do not occur.
- E. The Contractor agrees that insulation and any other construction materials containing asbestos or urea formaldehyde will not be used on the Work, and that all Sub-agreements will prohibit the use of construction materials (including, but not limited to, insulation) containing asbestos or urea formaldehyde.

3.04 DIFFERING HAZARDOUS MATERIAL CONDITIONS:

- A. If the Contractor unexpectedly encounters material reasonably believed to be Hazardous Material, the Contractor will immediately stop all affected Work, give written notice to the County and take appropriate health and safety precautions. Unless the Contract Documents require otherwise, the Contractor will conduct an investigation. If upon due investigation, the Contractor determines the material a Hazardous Material that may present a danger to persons or the surroundings, the Contractor will recommend a solution to the County. In any such case, the affected Work will be considered to have been under a suspension of Work.
- B. If the Hazardous Material is not required Work under the Drawings and/or Specifications, the County will proceed to have the Hazardous Material removed or rendered harmless through a Change Order or by means of another contract or as the County otherwise deems expedient. Alternatively, the County will terminate the affected Work or Contract for the County's convenience.
- C. If the County did not elect termination, once the Hazardous Material has been removed or rendered harmless, the affected Work will be resumed as directed in writing by the County. Any determination by the Florida Department of Community Health or the Department of Environmental Quality that the Hazardous Material has

been removed or rendered harmless will be binding upon the County and Contractor for the purposes of resuming the affected Work.

- D. If the Contractor is responsible for the Hazardous Material, the Contractor will bear its proportionate share of the delay and costs involved in cleaning up the Site and removing and rendering it harmless to the satisfaction of the County and all Political Subdivisions with jurisdiction. The Contractor will be solely responsible if the Hazardous Material was brought to the Site by the Contractor, or results in whole or in part from any violation by the Contractor of any applicable Laws.
- E. If the Contractor is responsible, but fails to take appropriate action, and the County acts accordingly, the Contractor will defend, save, indemnify and hold harmless the County from and against all claims arising from the County's exercise of appropriate action.
- F. If the Contractor is not responsible, the County will issue a Change Order with the necessary changes. The Change Order will adjust Contract Amount and/or Contract Time as made necessary by the changes and resulting unreasonable delay under the circumstances attributable to the County /Professional.

3.05 INCIDENTS WITH ARCHAEOLOGICAL FEATURES:

- A. The Contractor will immediately notify in writing, the County and all Federal, State and local agencies with jurisdiction of any Archaeological Feature deposits encountered or unearthed. The Contractor will protect such Archaeological Features in a proper and satisfactory manner. No further disturbance of the Archaeological Features will take place until work is allowed to resume in the affected areas.
- B. If the County concludes that the Contract Documents require changes because of Archaeological Feature deposits encountered, the County will issue a Change Order with the necessary changes in the Work. The Change Order also will adjust Contract Amount and/or Contract Time as made necessary by those changes and by any resulting unreasonable delay under the circumstances attributable to the County/Professional.

END OF SECTION

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**SECTION 01025
MEASUREMENT AND PAYMENT**

PART 1 - GENERAL

1.01 GENERAL PROVISIONS

- A. Unit Price Contracts: The quantities of work to be done and materials to be furnished under a unit price contract, as given in the Bid Form, are to be considered as approximate only and are to be used solely for the comparison of Bids received and determining an initial Contract Price. The Owner/Engineer does not expressly or by implication represent that the actual quantities involved will correspond exactly herewith; nor shall the Contractor plead misunderstanding or deception because of such estimate or quantities or of the character, location or other conditions pertaining to the Work. Payment to the Contractor will be made only for the actual quantities of work performed or material furnished in accordance with the Drawings and other Contract Documents, and it is understood that the quantities may be increased or diminished as provided in the General Conditions without in any way invalidating any of the unit prices bid.
- B. Lump Sum Contracts: The quantities of work to be done and materials to be furnished, including all labor, equipment and incidentals required to complete the Work, are specified in the Technical Specifications Divisions of the Contract documents and shown in the Contract Drawings. Payment to the Contractor of the lump sum price bid for the Work will be made and shall fully compensate the Contractor for the construction of the Work, completed and ready for continuous operation and use, in the manner contemplated by the Contract Documents.
- C. Unit Price and Lump Sum Contracts:
 - 1. 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 work to be done under this Contract.
 - 2. 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.
 - 3. All contracts shall be subject to 10% minimum retainer as defined in the General Conditions and the Agreement.

1.02 ALLOWANCES

- A. The Contractor shall include in the Total Bid Amount all cash allowances stated hereinafter. Items covered by these allowances shall be supplied for such amounts and by such persons as the Owner/Engineer may direct.

The amount of the allowance shall be adjusted accordingly by Change Order to recognize the actual cost incurred by the Contractor. The Contractor shall submit appropriate documentation to validate the actual cost of the item.

- B. Cash allowances for the purposes of bidding shall be in the following amounts and shall be so reflected in the Bid Form for the designated item.

1.03 SCHEDULE OF VALUES

A. Scope of Work

1. Submit to the Engineer a Schedule of Values within twenty (20) days after the Notice to Proceed.
2. A Schedule of Values shall be submitted for both lump sum and unit price contracts and the sum of the values in the schedule shall equal the Total Bid amount.
3. The Schedule of Values shall establish the actual value of the component parts of the Work and, unless objected to by the Engineer, shall be used as the basis for the Contractor's Applications for Payment.

B. Form and Content

1. Type the schedule on the Engineer's 8-1/2 x 11-inch standard form. Contractor's standard forms and computer printout will be considered for approval by the Engineer upon Contractor's request.
2. The values listed shall be the installed values of the component parts of the Work, including material, labor, overhead and profit, and all other costs associated with the installed value of each item.

- C. Unit Price Contracts: For unit price contracts, the Bid Schedule shall be used as the basis for the Schedule of Values. The Contractor shall resubmit the Bid Schedule in the format described herein, and may, at his option, divide the items in the Bid Schedule into sub-items to provide a more detailed basis of payment.

- D. Lump Sum Contracts: For lump sum contracts, the cost of the Work shall be separated into major items and sub-items as outlined below:

1. General Requirements (Division 01 Specification Sections)
 - a. Mobilization, Demobilization, Bonds and Permits
 - b. Shop Drawing Preparation /Submittal
 - c. Field Engineering and Exploratory Excavation
 - d. Record Drawing Preparation
 - e. All other costs associated with Division 01 of the Specifications
2. Site Work: The cost of the site work, with the exception of earthwork for structures and underground piping, shall be separated by task, with estimated quantities where applicable.
3. Structures: The cost of each structure shall be given separately, and each structure, at a minimum, shall be further separated into the following sub-items: earthwork, concrete forming, concrete reinforcement, concrete,

equipment, piping and appurtenances (to a point 5-feet outside of the structure), miscellaneous metals, electrical work (to a point 5-feet outside of the structure) and finishes.

4. Piping: The cost of piping shall be separated by pipe size and type, valves and appurtenances. The Contractor's estimated quantities and unit prices shall be included for each sub-item.
- E. The Owner reserves the right to delete any item included in the Schedule of Values and decrease the Contract Price by the scheduled amount for the item deleted.

1.04 APPLICATIONS FOR PAYMENT

- A. Applications for Payment shall be submitted by the Contractor to the Resident Project Representative (RPR) in accordance with the schedule established by the 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. The following items shall be included 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) and Sub Contractors
 - d. Consent of Surety
 - e. Invoices for Stored Material
 - f. Up to date As-Built drawings, red lines and coordinates (as per Section 1720, Project Record Documents).
 3. The 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" from each subcontractor and supplier shall be attached to each application for payment.
 4. Submit seven (7) copies of each application to the RPR. Each copy shall include original signatures. The RPR shall review the application and

verify quantities of installed work and stored materials. Upon his approval, he shall submit the application to the Owner for payment.

- 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 RPR or Owner for payment.
- D. The Application for Final Payment shall be prepared in accordance with Section 1001, General Requirements - Contract Closeout.

1.05 MEASUREMENT AND PAYMENT

A. Methods of Payment

- 1. Unit Price Contracts/Items: Payment will be made for actual quantities of work properly installed as approved by the Owner/Engineer unless otherwise indicated herein.
- 2. Lump Sum (LS) Contracts/Items: Payment will be made for each individual item on a percentage of completion basis as estimated by the Contractor and approved by the Owner/Engineer. Quantities provided in the Schedule of Values are for estimating the completion status for progress payments. Adjustments to costs provided in the accepted Schedule of Values may be made only by Change Order.

B. 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. Days (DAYS)
- 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 using 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 (LS) Contracts/Items:
 - a. The 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.
- C. 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 whether specifically described, mentioned or implied.
 - 1. Item 1 - Mobilization, Demobilization, Bonds, - and Permits - LS
 - a. Measurement: Measurement of various items for mobilization, demobilization, bonds, and permits will not be made for payment and all items shall be included in the lump sum price. This lump sum price shall not exceed 5% of the summation of total bid prices for items **6** through **17**.
 - b. Payment: Payment of 75% of the applicable lump sum price for the item shall be full compensation for the preparatory work and operations in mobilizing for beginning Work on the project including, but not limited to, multiple operations necessary for the movement of personnel, equipment, project signs, supplies and incidentals to the project site, establishment of field offices, storage sheds, safety equipment and first aid supplies, sanitary and other facilities, as required by these Specifications, and State and local laws and regulations; and any other preconstruction expense necessary for the start of the Work; the cost of bonds, permits and fees; construction schedules; shop drawings; temporary facilities; lay down/storage area; construction aids; erosion control; work associated with the contractor support during Owner/Engineer reviews and inspection; re-inspections; and any re-work resulting from same. Payment of the remaining 25% of the applicable lump sum price for the item shall be full compensation for finalization of this project including demobilization of personnel, equipment, supplies, and incidentals from the project site; project record documents; contract close-out documents; removal of field offices and storage; final site restoration; and clean-up. The Contractor shall submit invoices substantiating the cost of mobilization with each pay request.
 - 2. Item 2 – Indemnification - LS
 - a. Payment for Indemnification: In consideration of the Contractor's Indemnity Agreement as set out in the Contract Documents, Owner specifically agrees to give the Contractor a sum of \$100.00 and other good and valuable consideration, receipt of which is acknowledged upon signing of the Agreement.

3. Item 3 - Project Record Drawings - LS
 - a. Measurement: Measurement for this lump sum item will **be based on the percentage of the total value of the work performed to date, proportioned to the original contract amount.** This item shall include all areas of work encompassed by this project. **This lump sum price shall not be less than 1% of the summation of total bid prices for items 6 through 17.**
 - b. Payment: Payment of the lump sum price shall be full compensation for furnishing all labor, materials, equipment and services necessary to provide the specified record documents as stated in Section 01720 of these specifications.
4. Item 4 – Maintenance of Traffic - LS
 - a. Measurement: Measurement for this lump sum item shall be for the successful implementation of a vehicular and pedestrian maintenance of traffic during the construction period.
 - b. Payment: Payment of the appropriate percentage of the lump sum price shall be full compensation for furnishing all labor, materials and equipment necessary to provide safe and effective maintenance of vehicular and pedestrian traffic including but not limited to preparation and submittal of a complete traffic control plan, permitting and permitting fees, temporary lanes, walks or drainage facilities, flagmen, signs, barrels, barricades, control of dust, temporary crossing structures over trenches, any detour, facilities, lights and other protective devices and other special requirements for the safe and expeditious movement of traffic as necessary to meet FDOT standards and specifications.
5. Item 5 - Preconstruction Audio/Visual Documentation and Construction Photographs - LS
 - a. Measurement: Measurement for this lump sum item will be based on the ability to provide preconstruction audio/visual documentation and construction photographs.
 - b. Payment: Payment of the lump sum price of the item shall be full compensation for furnishing all labor, materials, equipment and services necessary to provide the preconstruction A/V documentation, furnishing all labor, materials, equipment and services necessary to provide the construction photographs for all utility and restoration related areas. Payment for construction photographs will be made once substantial completion has been awarded by Orange County.

6. Item 6 - 24" Ductile Iron Water Main Pipe, Fittings, & Valves (Open Cut Construction) - LF
 - a. Measurement: Open cut water main installation shall be measured in actual linear feet satisfactorily furnished and installed, as measured along the length of the centerline of the completed installed water main in accordance with the County requirements and specifications (Section 02660).
 - b. Payment: Payment will be made at the contract unit price bid per linear feet as stated in the proposal for open cut water main and shall include all labor, materials, and equipment necessary for a complete the open cut pipe installation and testing including dewatering, sampling and disposal, excavation, sheeting, shoring and bracing, backfill, fencing, protection of existing utilities, pipe, fittings, reducers, pipe connection assemblies and appurtenances, mechanical restraint, metallic tracer wire, sampling, drilling mud and mud disposal, sodding, testing, restoration, and clean-up. All costs to furnish and install such items shall be included.

7. Item 7 – 24" Gate Valve with Box
 - a. Measurement: The quantity for payment shall be the actual number of each size and type valve satisfactorily furnished, installed, and incorporated into the piping system.
 - b. Payment: Payment of the applicable unit price shall be full compensation for furnishing all labor, materials and equipment and installing the valve complete with valve box, cover, valve box extension, operating nut extension, valve wrench, restraining devices, test station box, concrete collar, identification disk (where applicable), bedding material, adjusting top of valve box to finished grade, clearing and grubbing, excavation, sheeting, shoring and bracing, dewatering, backfill, compaction, grading, temporary erosion control, flushing, testing, disinfection, and all incidental and related work to complete this item.

8. Item 8 – 24" Wet Tap - EA
 - a. Measurement: The quantity for payment shall be the actual number of each size and type of tapping sleeve and valve satisfactorily furnished and installed providing a live main connection or wet tap to the existing main(s).
 - b. Payment will be at the contract unit price and shall be full compensation for furnishing all labor, materials and equipment and complete installation for each tapping valve and sleeve assembly including size on size tapping sleeve, if necessary, valve box, cover, valve box extension, operating nut extension, valve wrench, restraining devices, test station box, concrete collar, identification disk (where applicable), bedding material, adjusting top of valve box to finished grade, clearing and grubbing, excavation, sheeting, shoring and bracing, dewatering, backfill, compaction, grading, temporary

erosion control, flushing, testing, and all incidental and related work to complete this item.

9. Item 9 – 24” Linestop - EA
 - a. Measurement: The quantity for payment shall be the actual number of each size of linestop satisfactorily furnished and installed on the existing water main.
 - b. Payment will be at the contract unit price and shall be full compensation for furnishing all labor, materials and equipment and complete installation for each linestop including clearing and grubbing, excavation, sheeting, shoring and bracing, dewatering, backfill, compaction, grading, temporary erosion control, testing, and all incidental and related work to complete this item.

10. Item 10 – 20” Wet Tap - EA
 - a. Measurement: The quantity for payment shall be the actual number of each size and type of tapping sleeve and valve satisfactorily furnished and installed providing a live main connection or wet tap to the existing main(s).
 - b. Payment will be at the contract unit price and shall be full compensation for furnishing all labor, materials and equipment and complete installation for each tapping valve and sleeve assembly including size on size tapping sleeve, if necessary, valve box, cover, valve box extension, operating nut extension, valve wrench, restraining devices, test station box, concrete collar, identification disk (where applicable), bedding material, adjusting top of valve box to finished grade, clearing and grubbing, excavation, sheeting, shoring and bracing, dewatering, backfill, compaction, grading, temporary erosion control, flushing, testing, and all incidental and related work to complete this item.

11. Item 11 – Removal of Existing 24” Water Main Pipe and Fittings - LF
 - a. Measurement: Removal of existing water main shall be measured in actual linear feet satisfactorily removed and disposed of, as measured along the length of the centerline of the removed water main in accordance with the County requirements and specifications (Section 02080).
 - b. Payment: Payment will be made at the contract unit price bid per linear feet as stated in the proposal for water main removal and shall include all labor, materials, and equipment necessary for the complete removal including dewatering, sampling and disposal, excavation, sheeting, shoring, backfill, fencing, protection of existing utilities, drilling mud and mud disposal, sodding, testing, restoration, and clean-up. All costs to furnish and install such items shall be included.
 - c. Payment: Payment of the applicable unit price shall be full compensation for furnishing all labor, materials and equipment for saw cutting and removal of the existing surface and base courses and

installing and compacting the replacement asphalt roadway or driveway. No additional payment shall be made for asphalt pavement removal and replacement where existing pavement is disturbed by the Contractor away from the new main or associated tie-ins unless authorized by the Owner.

12. Item 12 - Abandon Existing Water Main in Place - LF

- a. Measurement: The quantity for payment shall be the actual number of linear feet of water main pipe satisfactorily abandoned in place in accordance with the County requirements and specifications (Section 02080). Pipe abandonment shall be measured along the length of the centerline of the abandoned pipeline, regardless of the type, without deduction for the length of valves and fittings
- b. Payment: Payment of the applicable unit price shall be full compensation for furnishing all labor, materials and equipment and complete abandonment of the existing pipeline including, but not limited to; clearing and grubbing (unless otherwise covered), dewatering, excavation, tree and landscaping protection, trimming or removal, utility support and protection, sheeting, shoring and bracing (and/or trench box installation); backfilling, rough grading, compaction, erosion and sedimentation control including but not limited to staked silt fence, artificial coverings, sandbagging, slope drains, sediment basins, baled hay and straw and seeding, finish grading, pavement, sidewalk, flushing, cleaning, pressure testing, disinfection and cleanup. Also included in this item is the complete draining and properly disposing of the pipe contents; grout filling, and plugging or capping of existing pipes of all services and sizes designated "to be abandoned" on the Drawings.

13. Item 13 - Concrete Sidewalk Removal and Replacement - SY

- a. Measurement: The quantity for payment will be the actual number of square yards of concrete sidewalk satisfactorily removed and replaced and/or repaired in compliance with FDOT Standards and ADA Standards as necessary.
- b. Payment: Payment of the applicable unit price shall be full compensation for furnishing all labor, materials, and equipment for saw cutting and removal of the existing sidewalk and installing the replacement concrete sidewalk. No additional payment will be made for sidewalk restoration where existing sidewalks are disturbed by the Contractor away from the new main or associated tie-ins unless authorized by the Owner.

14. Item 14 - Utility Support and/or Protection - LS
- a. Measurement: Measurement for this lump sum item to support and protect all existing utilities affected by the new utility construction will not be made for payment.
 - b. Payment: Payment appropriate percentage of the lump sum price shall be full compensation for furnishing all labor, materials, equipment and services necessary to support and protect all existing utilities (including drainage piping and structures) exposed, unearthed, or otherwise affected by the new utility construction. Post excavation protection will include flowable fill backfill materials directly beneath the supported utility or other necessary means and methods of support and protection deemed suitable by the Contractor.
15. Item 15 - Contaminated Effluent Groundwater Disposal - LS
- a. Measurement: Measurement for this lump sum item is for Groundwater Treatment & Disposal occurs, including preparation of permit application (s) or time to obtain permit (s).
 - b. Payment: Payment appropriate percentage of the lump sum price shall be full compensation for furnishing all labor, materials, and equipment for providing all monitoring, testing, reporting, and disposing of contaminated groundwater produced from dewatering systems only when necessary to resolve regulatory compliance issues during construction.
16. Item 16 - Fire Hydrant - LS
- a. Measurement: Measurement for this item shall be made per actual number of fire hydrant assemblies satisfactorily furnished and installed to provide a complete and functional unit. The pipe and necessary restraint system connecting the fire hydrant assembly to the water main shall be included in the unit price, regardless of the length necessary to locate the hydrant at the direction of the County.
 - b. Payment: Payment of the applicable unit price shall be full compensation for furnishing all labor, materials and equipment necessary to install the fire hydrant complete with hydrant tee, hydrant extension, pipe, fittings, isolation valve and box, thrust anchorage, and shear pad. Also included is excavation, sheeting, shoring and bracing, dewatering, backfill, compaction, grading, connection to pipes, restoration, and all other items required for a complete, acceptable and operable installation.
17. Item 17 – Magnolia Tree Removal, Protection, and Replanting - EA
- a. Measurement: The quantity for payment shall be the actual number of trees satisfactorily removed, protected, and replanted in compliance with the Orange County Code, Chapter 15 Article VIII. Tree Protection and Removal as necessary.

- b. Payment: Payment of the applicable unit price shall be full compensation for furnishing all labor, materials, and equipment including all incidental and related work to complete this item.

END OF SECTION

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1 **SECTION 01027**

2 **APPLICATIONS FOR PAYMENT**

3 **PART 1 - GENERAL**

4 1.01 REQUIREMENT

5 A. This Section specifies administrative and procedural requirements governing the
6 Contractor's Applications for Payment.

7 B. Prior to submitting a monthly payment application, the Contractor's progressive As-Built
8 Drawings, As-Built Asset Attribute Data, Gravity Main, and Pipe Deflection Tables for
9 the period covered by the monthly payment application shall be submitted and accepted
10 by the County.

11 1.02 FORMAT

12 A. Format and Content: Use the accepted Schedule of Values.

13 1. Arrange the Schedule of Values in a tabular form with separate columns to indicate
14 the following for each item listed:

15 a. Generic name

16 b. Related specification section

17 c. Name of subcontractor

18 d. Name of manufacturer or fabricator

19 e. Name of supplier

20 f. Dollar value

21 2. Round amounts off to the nearest whole dollar. The total shall equal the Contract
22 Amount.

23 1.03 PREPARATION OF APPLICATION

24 A. Each Application for Payment shall be consistent with previous applications for
25 payments as certified and paid for by the County.

26 B. Payment Application Times: As stated in the General Conditions, Payment Applications
27 shall be submitted monthly on a day of the month established by the County at the Pre-
28 Construction Conference.

29 C. Application Preparation: Contractor shall complete every entry on the Pay Application
30 form. The form shall be executed by a person authorized to sign legal documents on
31 behalf of the Contractor and the signature notarized. Incomplete applications will be
32 returned without action. The following procedure shall be followed by the Contractor:

33 1. Submit applications typed on forms provided by the County.

34 2. Use data on Bid Form and approved Schedule of Values. Provide dollar value in each
35 column for each line item for portion of Work performed and for stored products.

- 1 3. List each authorized Change Order and use additional sheets if necessary, list Change
2 Order number and dollar amount for the original item of work.
- 3 4. Each item shall have an assigned dollar value for the current pay period and a
4 cumulative value for the project to-date.
- 5 5. Submit stored material log, partial waivers of claims and mechanic liens, and Consent
6 of Surety with each application, as further explained below.

- 7 D. Contractor shall submit a stored material log with each application for payment that
8 identifies the type, quantity, and value of all stored material that tracks when the stored
9 materials were installed and deducts the installed material from the stored quantity at that
10 time. Include original invoices for all stored materials for which payment is requested.

- 11 E. Waivers of Claims and Mechanics Lien (Waivers): With each Application for Payment
12 the Contactor shall submit waivers of claims and mechanic liens from Subcontractors,
13 Sub-subcontractors, and suppliers for the construction period covered by the previous
14 application.
 - 15 1. The Contractor shall submit partial waivers on each item for the amount requested,
16 prior to deduction for retainage, on each item.
 - 17 2. When an application shows completion of an item, the Contractor shall submit final
18 or full waivers.
 - 19 3. The Contractor shall submit the final Application for Payment with, if not already
20 submitted, the final waivers from every entity involved with performance of work
21 covered by the Application that could lawfully be entitled to a payment claim or lien.
 - 22 4. Format of Waiver Forms: The Contractor shall submit executed waivers of claims and
23 liens on forms acceptable to the County.
 - 24 5. The County reserves the right to designate which entities involved in the Work must
25 submit waivers.

- 26 F. Transmittal of Pay Applications: Contractor shall submit four (4) executed copies of each
27 Application for Payment to the County. One (1) copy shall include all waivers of lien
28 and similar attachments.
 - 29 1. The Contractor shall transmit each Pay Application package with a transmittal form
30 that lists attachments and all appropriate information related to the application. The
31 transmittal form shall be acceptable to the County.
 - 32 2. The Contractor shall include a certification with each application stating that all
33 previous payments received from the County under the Contract have been applied by
34 the Contractor to discharge, in full, all obligations of the Contractor in connection
35 with the Work covered by prior applications for payment. The Contractor shall also
36 certify that all materials and equipment incorporated into the Work are free and clear
37 of all liens, claims, security interest, and encumbrances.

- 38 G. Initial Application for Payment Submittal: Administrative actions and submittals that
39 must precede or coincide with submittal of the initial Application for Payment include
40 the following:
 - 41 1. List of Subcontractors
 - 42 2. List of principal suppliers and fabricators
 - 43 3. Schedule of Values
 - 44 4. Contractor's Construction Progress Schedule (accepted)

- 1 5. List of Contractor's staff assignments
- 2 6. Copies of building permits
- 3 7. Copies of authorizations and licenses from governing authorities for performance of
- 4 the Work
- 5 8. Certificates of insurance and insurance policies
- 6 9. Performance and Payment bonds (if required)
- 7 10. Data needed to acquire County's insurance

- 8 H. Monthly Application for Partial Payment Submittals: Administrative actions and
- 9 submittals that must precede or coincide with submittal of Monthly Applications for
- 10 Partial Payment include the following, as applicable:
 - 11 1. Relevant tests
 - 12 2. Progressive As-builts (one (1) paper copy and electronic copy)
 - 13 3. Table 01050-2 Asset Attribute Data Form Examples (one (1) paper copy and
 - 14 electronic copy)
 - 15 4. Table 01050-3 Pipe Deflection Table (one (1) paper copy and electronic copy)
 - 16 5. Table 01050-4 Gravity Main Table (one (1) paper copy and electronic copy)
 - 17 6. An electronic copy of all survey field notes
 - 18 7. Partial Release of Lien
 - 19 8. Partial Consent of Surety
 - 20 9. Site photographs
 - 21 10. Updated Progress Schedule: submit one (1) electronic copy and five (5) copies
 - 22 11. Summary of Values
 - 23 12. Pay Request
 - 24 13. On-Site Storage of materials

- 25 I. Substantial Completion Application for Payment Submittal: Following issuance of the
- 26 Certificate of Substantial Completion, Contractor shall submit an Application for
- 27 Payment. This Application shall reflect any Certificates of Partial Substantial
- 28 Completion issued previously for the County's occupancy of designated portions of the
- 29 Work.
 - 30 1. Administrative actions and submittals that shall precede or coincide with this
 - 31 application include:
 - 32 a. Occupancy permits and similar approvals
 - 33 b. Warranties (guarantees) and maintenance agreements
 - 34 c. Test/adjust/balance records
 - 35 d. Maintenance instructions
 - 36 e. Meter readings
 - 37 f. Start-up performance reports
 - 38 g. Change-over information related to the County's occupancy, use, operation and
 - 39 maintenance
 - 40 h. Final Cleaning
 - 41 i. Application for reduction of retainage and consent of surety
 - 42 j. Advice on shifting insurance coverage
 - 43 k. List of incomplete Work, recognized as exceptions to County's Certificate of
 - 44 Substantial Completion

- 1 J. Final Completion Application for Payment Submittal: Administrative actions and
2 submittals which must precede or coincide with submittal of the final payment
3 Application for Payment include the following:
4 1. Prior to submitting a request for final payment or the County issuing a Certificate of
5 Completion for the Work, the Contractor shall submit the final Record Documents to
6 the County for approval. Retainage funds will be withheld at the County's discretion
7 based on the quality and accuracy of the final Record Documents.
8 2. Written signed statements by the Contractor
9 a. Completion of project close-out requirements
10 b. Completion of items specified for completion after Substantial Completion
11 c. Assurance that unsettled claims are settled
12 d. Assurance that work not complete and accepted is now completed
13 3. Transmittal of Record Documents to the County
14 4. Proof that taxes, fees, and similar obligations have been paid
15 5. Removal of temporary facilities and services has been completed
16 6. Removal of surplus materials, rubbish, and similar elements
17 7. Prepare Application for Final Payment as required in General Conditions

18 1.04 PAY APPLICATION SUBSTANTIATING DATA

19 A. When the County requires substantiating data for a Pay Application, submit data
20 justifying Pay Application line item amounts in question.

21 B. Provide one (1) copy of data with a transmittal letter for each copy of Pay Application
22 submittal. The Pay Application number, date, and line item by number and description
23 shall be clearly stated.

24 **PART 2 - PRODUCTS (NOT USED)**

25 **PART 3 - EXECUTION (NOT USED)**
26

27 **END OF SECTION**

**SECTION 01041
PROJECT COORDINATION**

PART 1 - GENERAL

1.01 PIPE LOCATIONS

- A. Pipelines shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons. 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.

1.02 OPEN EXCAVATIONS

- A. 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 his own expense, provide suitable and safe bridges and other crossings for accommodating travel by workmen.

1.03 TEST PITS

- A. Test pits for the purpose of locating underground pipelines or structures in advance of the construction shall be excavated and backfilled by the Contractor. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to the Engineer. The costs for such test pits shall be borne by the Contractor.

1.04 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every precaution 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 similar or equal to that existing before the damage was done, or he shall make good the damage in other manner acceptable to the Engineer.

1.05 COORDINATION WITHIN THIS CONTRACT

- A. The Contractor shall, prior to interrupting a utility service (water, sewer, etc.) for the purpose of making cut-ins to the existing lines or for any other purposes, contact the Owner and make arrangements for the interruption which will be satisfactory to the Owner.

- B. All contacts, requests, changes, communications and coordination with the County shall be initiated through the County's Resident Project Representative (R.P.R.). Any other communication or request that is not initiated through the RPR will be null and void. The RPR will decide if a Construction Assistance Request (C.A.R.) is needed. All training, spare parts distribution, and other activities described elsewhere shall always require a C.A.R. with seven (7) days' notice. Contractor will not have contact with OCU Operations without R.P.R.'s knowledge.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

CONSTRUCTION ASSISTANCE REQUEST

CAR Ref. # _____

Date Submitted:

Time Submitted:

Project#

Submitted by: _____

(Print Name)

(Signature)

Date for Assistance:

Request assistance to perform the following task:

_____ See Attached Information

Orange County Inspector Comments:

Signature: _____

NWRF

Facility representative: _____ - _____

(Name)

(Signature)

_____ Approved

_____ Disapproved

Comments:

Computer Room

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1 **SECTION 01050**

2 **SURVEYING AND FIELD ENGINEERING**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. Professional Surveyor: Provide professional surveying and mapping work required for the
6 execution of the Contract, including verification of existing survey data, construction layout, and
7 production of the As-Built Drawings. This Work shall be performed by a Surveyor that is licensed
8 by the State of Florida as a Professional Surveyor and Mapper pursuant to Chapter 472, F.S.

9 B. Professional Engineer: The Contractor shall provide the services of a Registered
10 Professional Engineer currently licensed in the State of Florida for the required field
11 engineering services as applicable to the work.

12 1.02 REQUIREMENTS

13 A. Survey Services

14 1. The Contractor shall retain the services of a registered Surveyor and Mapper licensed
15 in the State of Florida to provide professional surveying and mapping services
16 necessary for the construction including a control survey and an as-built survey
17 during construction. The Surveyor will identify control points (monuments and
18 benchmarks noted on the Drawings). The construction layout survey shall be
19 established from the control points shown on the Construction Drawings. The control
20 points shall be confirmed by the contractor prior to start of construction. The
21 accuracy of any method of staking shall be the responsibility of Surveyor. All staking
22 shall be done to provide for easy verification of the work by the County.

23 B. Field Engineering Services

24 1. The Engineer shall be of the discipline required for the work.
25 2. The Engineer shall be responsible for duties during Construction to include, but not limited to:
26 a. Inspections, testing, witnessing requiring a licensed Professional Engineer.
27 b. Design of temporary shoring, bridging, scaffolding or other temporary
28 construction, formwork and protection of existing structures.
29 c. Other requirements as specified herein.
30 3. Engineering related designs and inspections shall be signed by the licensed
31 Professional Engineer as required by the County.

32 1.03 SUBMITTALS

33 A. Provide qualifications of the Surveyor or Engineer.

34 1. A Florida Registered Professional Engineer or Registered Surveyor and Mapper, who
35 is proposed by the Contractor to provide services for the work, shall be acceptable to
36 the County prior to field services being performed.

- 1 2. Submit name, address and telephone number of the Surveyor and/or Engineer, as
2 appropriate to the County for acceptance before starting survey or engineering work.
3 3. Submit written acknowledgement from the Surveyor stating that he has the hardware,
4 software and adequate scope of services in his agreement with the Contractor to fully
5 comply with the requirements of this specification.

6 B. On request, submit documentation verifying accuracy of survey work.

7 C. Surveyor shall submit certified Table 01050 - 2 and 3.

8 **PART 2 - PRODUCTS**

9 2.01 SURVEY DOCUMENTS

10 A. Survey documents shall comply with the Minimum Technical Standards of Chapter 5J-17
11 of the Florida Administrative Code (FAC) and Table 01050-1 Minimum Survey
12 Accuracies, whichever are more stringent. All coordinates shall be geographically
13 registered in the Florida State Plane Coordinate System using the contract Drawings
14 control points for horizontal and vertical controls.

15 B. The Surveyor shall not copyright any of their work related to this project.

16 C. For ease of calculating pipe deflections in Table 01050-3, begin by providing a unique
17 asset ID for each utility (water, wastewater or reclaimed water) type, numbered
18 sequentially along the pipe run (including changes in direction) from start to finish of the
19 pipe in Table 01050-2 (Pipe Worksheet). Then branches and services of the same utility
20 type can be numbered. It is recommended that each utility numbering format be
21 distinguishable from the other. This will allow organization and convenient sorting after
22 the individual asset table worksheet tabs are combined in the spreadsheet program prior
23 to copying and pasting to the deflection table spreadsheet. The Microsoft Excel
24 spreadsheet template shall be provided by the County.. The numbering system shall be
25 approved by the County before commencing with production of the spreadsheet.
26

**Table 01050-1
Minimum Survey Accuracies**

Type	Horizontal Accuracy (feet)	Elevation Accuracy (feet)	Location: Horizontal Center and Vertical Top, unless otherwise specified
Bench Marks	0.01	0.01	Point
Baseline Control Locational Accuracy	0.01	N/A	Point
Tract and Easement Corners	*	N/A	Survey Monuments
Pipe, at 100-foot maximum intervals	0.1	0.1	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing
Pipe, (PVC) >16-inch at every pipe joint	0.1	0.1	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing
Fittings, Sleeves, Tapping Saddle, Service Saddles, Cap or Plugs.	0.1	0.1	
Pipe, Restrained	0.1	0.1	Restrained Joint Limits
Connections	0.1	0.1	Pipe
Bore & Jack Casing	0.1	0.1	Top of Casing at the Casing Limits
Directional Drill	0.1	0.1	10-foot intervals during the directional drill operation or intervals not to exceed the drilling rod length
Hydrants	0.1	0.1	Operating Nut
Valves (Operating Nut)	0.1	0.1	Operating Nut
Valve (Pipe Location)	0.1	0.1	Top of Pipe at Valve location
Air Release, Blow off, and Backflow Valves	0.1	0.1	Valve Enclosure
Master Meters, Deduct Meters & Wastewater Meters	0.1	0.1	Register
Meter Box	0.1	0.1	
Clean out -	0.1	0.1	
Manhole Rim	0.1	0.1	Manhole – top of rim
Manhole Inverts	N/A	0.01	Pipe Inverts
Pump Station (Public & Private)	0.1	0.01	Wetwell top of slab and Pipe Inverts
Production Well or Monitoring Well	0.1	0.1	Well – top of casing
Grease Interceptor	0.1	0.1	
Oil / Water Separators	0.1	0.1	
Pipe, abandoned in place or removed	0.1	0.1	Limits of Abandoned or Removed Pipe
Existing Utilities and appurtenant structures**	0.1	0.1	underground feature or structure
<p>* Shall conform to the requirements of the "Chapter 5J-17, 'Minimum Technical Standards', FAC", certified by a SURVEYOR.</p> <p>** Existing utilities including but not limited to water, wastewater, reclaimed water, stormwater, fiber optic cable, electric, gas and structures within the limits of construction.</p> <p>*** Fittings rotated in X,Y,Z plane or vertical shall be shot to maintain flowline for the horizontal and vertical locations of the coordinate</p>			
<p>Note: All survey values to be reported to second decimal point (x.xx)</p>			

TABLE 01050-2
Asset Attribute Data Examples

Hydrants Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Manufacturer	Model #	Comments
FH-1	C-7	518456.40	1483743.63	49.53	Brand B	XJ7-B	
FH-2	C-9	518477.68	1483758.95	54.23	Brand B	XJ7-B	

Valves Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Valve Type	Main Type	Valve Size	Valve Manufacturer	Valve Model #	# of Turns to Close	Gear Actuator	Gear Ratio	Side Actuator	Actuator Manufacturer	Comments
ARV-1	C300	518069.09	1483231.33	81.72	ARV - Combination	Water Main	2	Brand H	100XT						
ARV-1	C303	518083.55	1483280.50	81.15	ARV - Vacuum Backflow Preventer	Force Main	4	Brand G	1000						
BFP-1	C303	518086.00	1483282.88	78.21		Reclaimed Water Main	8	Brand F	2000 fgs						
BO-9	C405	518089.83	1483289.43	78.20	Blowoff	Water Main	2	Brand E	14 turbo						
BFV-1	C405	518088.11	1483295.00	81.95	Butterfly Gate	Water Main	30	Brand D	230 xls	200	Yes	3 to 1	Yes	Brand C	
GV-3	C405	518132.54	1483372.75	81.23		Water Main	16	Brand C	2225846	300	Yes	3 to 1	NO		
LS-W1	C405	576779.36	1539706.97	64.30	Line Stop	Water Main	16	Brand B	76r44						
PV-22	C405	576880.60	1539718.32	64.52		Force Main	12	Brand A	Z100	200	Yes	3 to 1	Yes	Brand A	

Manhole Worksheet

ID Number	Plan Sheet #	Easting	Northing	Rim Elevation	Invert Elev N	Invert Elev NE	Invert Elev E	Invert Elev SE	Invert Elev S	Invert Elev SW	Invert Elev W	Invert Elev NW	Manufacturer	Comments
SAN-MH01	AT-2	475216.00	1501637.12	115.89								111.28	Del Zotto	
SAN-MH02	AT-2	474885.63	1501636.02	114.98									Del Zotto	
SAN-MH03	AT-2	474849.33	1501600.22	115.18		109.96			109.86				Del Zotto	
SAN-MH04	AT-2	474850.21	1501416.85	115.91	109.19		110.42		108.56				Del Zotto	
SS-1	C1.05A	478117.70	1501622.99	118.13					113.73				Del Zotto Products of Florids Inc.	Del Zotto Products of Florids Inc.
SS-2	C1.05A	478116.77	1501534.19	117.79	113.41				113.38				Del Zotto Products of Florids Inc.	Del Zotto Products of Florids Inc.
SS-3	C1.05	478111.28	1501152.49	116.45	111.98				111.94				Del Zotto Products of Florids Inc.	Del Zotto Products of Florids Inc.
SS-4	C1.05A	478105.19	1500781.07	115.72	110.76			110.75					Del Zotto Products of Florids Inc.	Del Zotto Products of Florids Inc.

Meter Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Comments
MM-1	C-6	576533.64	1539520.08	58.01	Water Main	
RWMM-1	C-6	576937.42	1539598.78	64.84	Reclaimed Water Main	

Fitting Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Fitting Type	Comments
FM-1	C-3	572399.28	1539339.13	46.27	Force Main	Bend 11 1/4°	
FM-2	C-3	574840.74	1539856.91	51.73	Force Main	Bend 22-1/2°	
RW-1	C-4	574887.22	1539849.64	51.75	Reclaimed Water Main	Cross	
RW-2	C-4	574904.30	1539849.56	48.98	Reclaimed Water Main	Reducer	
WM-1	C-5	572532.38	1539848.16	54.42	Water Main	Tapping Saddle	
WM-2	C-5	572631.00	1539337.10	45.27	Water Main	Tee	

Cleanout Worksheet

ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
CO-1	C-6	576533.64	1539520.08	58.01	
CO-2	C-6	576937.42	1539598.42	64.84	Sanitary Service

1 **Pipes Worksheet**

Asset Attribute Table Examples												
A	C	D	E	F	G	H	I	J	K	L	M	
ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Type of Shot	Construction Method	Material	Pressure Class	Manufacturer	Comments	
1												
2	CSNG-1	C-4	517827.57	1482195.46	78.83	Force Main	Bore & Jack (Casing)	PVC	DR18	Brand A		
3	CSNG-2	C-4	517848.20	1482195.31	78.38	Force Main	Bore & Jack (Casing)	PVC	DR18	Brand A		
4	RW-1	C-7	517731.98	1482237.24	80.42	Reclaimed Water Main	Restraint Joint Limit	Open Cut	DIP	Class 250	Brand B	
5	RW-2	C-7	517732.85	1482338.10	80.94	Reclaimed Water Main	Restraint Joint Limit	Open Cut	DIP	Class 250	Brand B	
6	WM-1	C-9	573309.07	1539372.90	56.10	Water main	Shot on Pipe	Open Cut	PVC	DR18	Brand C	
7	WM-2	C-9	573308.75	1539375.00	54.66	Water main	Shot on Pipe	Open Cut	PVC	DR18	Brand C	
8	FMDD-1	C-4	504345.94	1488969.20	114.14	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X	
9	FMDD-2	C-4	504360.86	1488970.50	112.74	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X	
10	FMDD-3	C-4	504377.19	1488971.20	108.14	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X	
11	FM-9	C-4	504480.47	1488952.90	105.24	Force Main	Shot on Pipe	Open Cut	PVC	DR18	Brand C	
12												

2
3 **Pump Station Worksheet**

Asset Attribute Table Examples					
A	C	D	E	F	G
ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
1					
2	PS-1	C-40	517914.35	1482906.56	83.91
3					

4
5 **Well Worksheet**

Asset Attribute Table Examples						
A	C	D	E	F	I	
ID Number	Plan Sheet #	Easting	Northing	Elevation	Well Type	Comments
1					Well	
2					Monitoring Well	
3						
4						

6
7 **Easements Worksheet**

Asset Attribute Table Examples						
A	C	D	E	F	G	H
ID Number	Plan Sheet #	Easting	Northing	Elevation	Boundary Corner Type	Comments
1						
2	Corner-1	C-8	463484.59	1511029.72	Pump Station Tract	N.W. CORNER
3	Corner-2	C-8	463523.24	1511040.01	Pump Station Tract	N.E. CORNER
4	Corner-3	C-8	463480.45	1511015.23	Pump Station Tract	S.W. CORNER
5	Corner-4	C-8	463526.97	1511025.49	Pump Station Tract	S.E. CORNER
6					Easement	
7					Property	
8						
9						

8
9 **Existing OC Utility Crossing**

Asset Attribute Table Examples							
A	C	D	E	F	G	H	I
ID Number	Plan Sheet #	Easting	Northing	Existing Pipe Elevation	Proposed Crossing Elevation	Existing Main Type	Comments
1							
2							
3	CR-02	AT-1	474767.95	1500585.09	98.20	106.20	Force Main
4	CR-03	AT-1	475239.63	1500596.35	99.10	113.88	Force Main
5	CR-04	AT-1	475239.61	1500588.49	94.30	112.45	Reclaimed Water Main
6	Conf-1	C-750	463464.47	1511013.75	100.54	104.88	Water main
7	Conf-2	C-750	463163.91	1510693.49	98.32	103.57	Storm Main
8							

10
11 **Grease Interceptor**

Asset Attribute Table Examples						
A	C	D	E	F	G	H
ID Number	Plan Sheet #	Easting	Northing	Elevation	Volume (Gallons)	Comments
1						
2	GI-1	C-400	508387.30	1487203.18	89.70	1000.00
3						
4						

1
2

**TABLE 01050-3
Pipe Deflection Data EXAMPLE**

Project Contractor: Progress Mtg Date: Contract # Dwg Sheet # Utility Type Pipe Manufacturer Pipe size & material PVC Manufacturer Deflection County Allowable Deflection 75% Allowable Angle of Offset Allowable Radius of Curvature Laying Length of Pipe	FM National Pipe 16" PVC C905 6 inches 4.5 inches 1.5 degrees 764 feet 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 ft	Length BC ft	Length AC ft	XYZ (w elevation) degrees	XYZ (w elevation) ft	per laying length degrees	per laying length 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 been inputted Values in yellow are over spec

3

*Uses law of cosines to determine angle ABC and Ø.
 $\text{angle } ABC = \arccos((AB^2 + BC^2 - AC^2) / (2 * AB * BC))$
 $180 - \text{angle } ABC = \text{angle } \phi$
 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 law of sines, using the chord length AC and radius R.
 Since $\sin((\phi/2) * (\pi/180)) = (\text{Chord}/2) / R$ and length AC = Chord
 $R = AC / (2 * \sin(\phi * \pi / 360))$
 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.

4

1
2

**TABLE 01050-4
Gravity Main**

Downstream		Upstream		Length (ft)	Length (ft)	Constructed Slope	Constructed Allowable Slope
Manhole Number	Invert Elev.	Manhole Number	Invert Elev.				

3 **PART 3 - EXECUTION**

4 3.01 SURVEY FIELD WORK

5 A. Locate, reference, and preserve existing horizontal and vertical control points and
6 property corners shown on the Drawings prior to starting any construction. If the
7 Surveyor performing the work discovers any discrepancies that will affect the Project, the
8 Contractor must immediately report these findings to the County. All survey work shall
9 meet the requirements as defined in Florida Administrative Code 5J-17. Reference and
10 preserve all survey points during Construction. If survey points are disturbed, it is the
11 responsibility of the Surveyor to reset the points at the Contractor's expense. Copies of
12 the Surveyor's field notes and/or electronic files for point replacement shall be provided
13 to the County.

- 14 1. The Surveyor shall locate all improvements for the project As-Built Asset Attribute Data
15 using State Plane Coordinates as the horizontal datum and the benchmark referenced on
16 the Drawings as the vertical datum. The County will provide electronic files of the
17 Drawings to be used by the Surveyor.
- 18 2. The construction layout shall be established from the reference points shown or listed
19 on the Drawings. The accuracy of any method of staking shall be the responsibility of
20 the Contractor. All construction layout staking shall be done such as to provide for
21 easy verification of the Work.

22 B. All control points shall be protected by the Contractor from disturbance. If the
23 monuments are disturbed, any Work that is governed by these monuments shall be held
24 in abeyance until the monuments are reestablished by the Surveyor and approved by the
25 County. The accuracy of all the Contractor's stakes, alignments and grades is the
26 responsibility of the Contractor. However, the County has the discretionary right to check
27 the Contractor's stakes, alignments, and grades at any time.

- 1 C. Use survey control points to layout such work tasks including but not limited to:
2 1. Clearing, grubbing, work limits, right-of-way lines and easements
3 2. Locations for pipelines and all associated structures and appurtenances
- 4 D. The Surveyor shall reference and replace any project control points, boundary corners,
5 benchmarks, section corners, and right-of-way monuments that may be lost or destroyed,
6 at no additional cost to the County. Establish replacement points based on the original
7 survey control.

8 3.02 SURVEY DOCUMENTS DELIVERABLES

- 9 A. Tables 01050-2 Asset Attribute Data, 01050-3 Pipe Deflection Data, shall conform with
10 Section 01027 "Application for Payment" and Section 01720 "Project Record
11 Documents."
12 B. Provide a minimum of three (3) signed and sealed survey sets for all Clearances, Partial
13 Clearances and final asbuilt / record drawings submittals including digital media
14 comprising of asset table, deflection table, manhole table, CADD drawings and scanned
15 pdf to the County.
16 C. Provide at minimum monthly progressive as-built documents including hardcopy and
17 digital submittal to the County.
18

19 END OF SECTION

SECTION 01065
PERMITS AND FEES

PART 1 - GENERAL

1.01 REQUIREMENTS

A. General

1. Upon Notice of Award, obtain and pay for all appropriate and applicable permits and licenses as provided for in the General Conditions, except as otherwise provided herein.
2. Schedule all inspections and obtain all written approvals of the agencies required by the permits and licenses.
3. Strictly adhere to the specific requirements of the regulatory unit(s) or agency(cies) having jurisdiction over the Work. Whenever there is a difference in the requirements of a jurisdictional body and the Contract Documents, the more stringent shall apply.
4. A copy of the permits obtained by the County are furnished as an appendix "Permits Obtained by County" of these specifications.

B. Building Permit (Orange County)

1. The County will pay the general building permit fee and any related impact fees or assessments to be paid to Orange County.
2. The Contractor shall pay all fees associated with obtaining Orange County trade permits and any and all inspection fees for the Orange County Building Department providing inspections for this project. The Contractor shall apply for and obtain the building permits from Orange County and schedule and obtain final approval from the building inspectors.
3. Information on Orange County Building Department fees is included in the Instructions to Bidders in Division 0.
4. The Contractor shall be responsible for scheduling all permit inspections and obtaining inspection approval from Orange County, as required by the building and sub-discipline construction permits.

C. Construction Dewatering Permit

The Contractor shall apply and pay for all fees associated with obtaining Florida Department of Environmental Protection District Office construction dewatering permits, if required. The Contractor shall provide all materials and equipment to comply with the permit requirements at no additional cost to the County.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

1
2

3

END OF SECTION

SECTION 01070
ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 STANDARDS AND ABBREVIATIONS

- A. Referenced Standards: 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.
- C. Abbreviations:

AA	Aluminum Association
AAA	American Arbitration Association
AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHO	The American Association of State Highway Officials
ABA	American Bar Association
ABMA	American Boiler Manufacturers Association
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
AEIC	Association of Edison Illuminating Companies
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association
AGC	Associated General Contractors of America
AGMA	American Gear Manufacturers Association
AHA	American Hardboard Association

AI	The Asphalt Institute
AIA	American Institute of Architects
AIA	American Insurance Association
AIEE	American Institute of Electrical Engineers (Now IEEE)
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Moving and Condition Association
ANSI	American National Standard Institute
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ARI	American Refrigeration Institute
ASA	American Standards Association (Now ANSI)
ASAHC	American Society of Architectural Hardware Consultants
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSCBC	American Standard Safety Code for Building Construction
ASSHTO	American Association of State Highway Transportation Officials
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWI	Architectural Woodwork Institute

AWPA	American Wood Preservers Association
AWPB	American Wood Preservers Bureau
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders Hardware Manufacturers Association
BIA	Brick Institute of America (formerly SCPI)
CDA	Copper Development Association
CFS	Cubic Feet Per Second
CMAA	Crane Manufacturers Association of America
CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
DHI	Door and Hardware Institute
DIPRA	Ductile Iron Pipe Research Association
DOT Spec	Standard Specification for Road and Bridge Construction Florida Department of Transportation, 1982
E/A	Engineer and/or Architect
EDA	Economic Development Association
EEI	Edison Electric Institute
EPA	Environmental Protection Agency
FCI	Fluid Control Institute
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
Fed Spec	Federal Specification
FPS	Feet Per Second
FS	Federal Standards

GPM	Gallons Per Minute
HMI	Hoist Manufacturers Institute
HP	Horsepower
HSBII	Hartford Steam Boiler Inspection and Insurance Co.
ID	Inside Diameter
IEEE	Institute of Electrical and Electronic Engineers
IFI	Industrial Fasteners Institute
IPCEA	Insulated Power Cable Engineers Association
IPS	Iron Pipe Size
MGD	Million Gallons Per Day
MHI	Materials Handling Institute
MMA	Monorail Manufacturers Association
NBFU	National Board of Fire Underwriters
NBHA	National Builders' Hardware Association
NBS	National Bureau of Standards
NCSA	National Crushed Stone Association
NCSPA	National Corrugated Steel Pipe Association
NEC	National Electrical Code
NECA	National Electrical Contractors' Association
NEMA	National Electrical Manufacturers' Association
NFPA	National Fire Protection Association
NLA	National Lime Association
NPC	National Plumbing Code
NPT	National Pipe Threads
NSC	National Safety Council
NSF	National Sanitation Foundation

OD	Outside Diameter
OSHA	U.S. Department of Labor, Occupational Safety and Health Act
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	United States Products Standards
PSI	Pounds per Square Inch
PSIA	Pounds per Square Inch Absolute
PSIG	Pounds per Square Inch Gauge
RAS	Return Activated Sludge
RPM	Revolutions Per Minute
SAE	Society of Automotive Engineers
SDI	Steel Decks Institute
SJI	Steel Joists Institute
SJRWMD	St. Johns River Water Management District
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SSI	Scaffolding and Shoring Institute
SSPC	Steel Structures Painting Council
SSPC	Structural Steel Painting Council
STA	Station (100 feet) Intervals
TDH	Total Dynamic Head
TH	Total Head
UBC	Uniform Building Code
UL	Underwriter's Laboratories, Inc.
USASI or	United States of America Standards Institute

Additional abbreviations and symbols are shown on the Drawings.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01200
PROJECT MEETINGS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Contractor participation in pre-construction conferences, progress meetings and specially called meetings.

1.02 MEETINGS CALLED BY THE COUNTY

- A. The County/Engineer will schedule and administer a pre-construction conference, periodic progress meetings and specific topic meetings throughout the progress of the Work. The County will:

1. Prepare and distribute a notification of the meeting to required attendees.
2. Establish, prepare and distribute an agenda with the notification.
3. Make physical arrangements for the meetings.
4. Preside at meetings.
5. Prepare and distribute minutes of meetings including significant proceedings and decisions, within 15 working days after each meeting. Minutes of the meeting will be forwarded to all participants and to parties affected by decisions made at the meeting.

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

- C. The meeting location will generally be a central site, convenient for all parties, designated by the County.

- D. All meetings shall be digitally recorded and copies of the recordings will provide to all requesting parties.

1.03 PRE-CONSTRUCTION CONFERENCE

- A. Attendance:

1. County
2. Contractor and superintendent
3. Subcontractors as appropriate to the agenda
4. Representatives of suppliers and manufacturers as appropriate to the agenda
5. County MBE/WBE representative
6. Other agency representatives (FDEP, EPA, City, etc.)
7. Surveyor – recommended but required if Surveyor has not previously performed work for the County
8. Others as requested by the County or Contractor

- 1 B. Suggested Agenda:
- 2 1. Distribution and discussion of:
- 3 a. List of major Subcontractors and suppliers
- 4 b. Construction schedules
- 5 c. Contact information
- 6 2. Organizational arrangement of Contractor's forces and personnel, and those of
- 7 Subcontractors, material and equipment suppliers, and the County
- 8 3. Critical work sequencing
- 9 4. Major equipment deliveries
- 10 5. Project coordination
- 11 a. Designation of responsible personnel
- 12 b. Channels and procedures for communication
- 13 6. Procedures and processing of:
- 14 a. Field decisions
- 15 b. Proposal requests
- 16 c. Submittals
- 17 d. Change orders
- 18 e. Applications for payment/Schedule of Values
- 19 f. Contractor quality control
- 20 g. Submittal of Shop Drawings, project data and samples
- 21 7. Adequacy of distribution of Contract Documents
- 22 8. Procedures for maintaining as built and record documents
- 23 9. Use of premises:
- 24 a. Office, work and storage areas
- 25 b. County's requirements
- 26 c. Housekeeping
- 27 10. Temporary construction facilities
- 28 11. Temporary utilities
- 29 12. Safety and first aid procedures
- 30 13. Rules and regulations
- 31 14. Security procedures
- 32 15. Place, date and time for regular progress meetings
- 33 16. Completion time for Contract and liquidated damages

34 1.04 PROGRESS MEETINGS

- 35 A. The County shall schedule progress meetings at least once per month as required by
- 36 progress of the Work with the first meeting approximately one (1) month after the pre-
- 37 construction meeting.
- 38 B. Attendance:
- 39 1. County
- 40 2. Contractor
- 41 3. Subcontractors as appropriate to the agenda
- 42 4. Suppliers as appropriate to the agenda
- 43 5. Others as appropriate

- 1 C. The Contractor's representative is to attend the project meetings and have the authority to
2 act on behalf of the entity represented on field related matters. Contractor's
3 representative is to study previous meeting minutes and current agenda items, in order to
4 be prepared to discuss pertinent topics and provide specific information including but not
5 limited to:
6 1. Status of submittals and actions necessary to expedite them
7 2. Status of activities behind schedule and actions necessary to regain the approved
8 schedule
9 3. Status of materials and equipment deliveries and action necessary to expedite
10 materials and equipment and maintain the approved schedule
11 4. Status of open RFI's and actions necessary to address them
- 12 D. To the maximum extent practicable, the Contractor is to assign the same personnel to
13 represent the Contractor at Progress Meetings throughout the progress of the work.
- 14 E. The Contractor is to provide a current Shop Drawing submittal log at each progress
15 meeting.
- 16 F. The Contractor is to provide copies of the updated Progress Schedule at each project
17 meeting in accordance with the General Conditions including a three (3) week look ahead
18 schedule for upcoming events.
- 19 G. Suggested Agenda:
20 1. Review and approve minutes from previous meeting
21 2. Review of work progress since previous meeting to include current As-Builts
22 3. Contractor's/Subcontractor's workforce and equipment
23 4. Progressive As-Built Drawings
24 5. Surveyor's submittals
25 a. As-Built Asset Attribute Data Table (see Table 01050-2)
26 b. Pipe Deflection Table (see Table 01050-3)
27 c. Gravity Main Table (see Table 01050-4)
28 6. Field observations, problems and conflicts
29 7. Construction progress and problems which impede construction schedule
30 8. Shop Drawing submittal status
31 9. Requests for Information (RFI) status
32 10. Change Order status
33 11. Review of off site fabrication and delivery schedules
34 12. Corrective measures and procedures to regain approved schedule
35 13. Revisions to construction schedule
36 14. Job progress and schedule for succeeding work period
37 15. Coordination of schedules
38 16. Maintenance of quality standards
39 17. Review submittal schedule; expedite as required
40 18. Pending requests for information, changes and substitutions
41 19. Review proposed changes for effect on construction schedule and completion date
42 20. Pay application status
43 21. Other business

- 1 H. Revision to Minutes:
2 1. Unless minutes are challenged, in writing, prior to the next regularly scheduled
3 Progress Meeting, they will be accepted as properly summarizing the discussions and
4 decisions of the meeting.
5 2. Persons challenging minutes shall reproduce and distribute copies of the challenge to
6 all indicated recipients of the particular set of minutes.
7 3. Challenge to minutes shall be settled as priority portion of "old business" at next
8 regularly scheduled meeting.

9 **PART 2 - PRODUCTS (NOT USED)**

10 **PART 3 - EXECUTION (NOT USED)**
11

12 **END OF SECTION**

**SECTION 01300
SUBMITTALS**

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work

1. The Contractor shall submit to the Engineer for review, shop drawings, test reports and data on materials and equipment (hereinafter in this article called data), material samples (hereinafter in this article called samples), and certifications as are required for materials and equipment specified in the Specifications and the Contract Drawings.
2. The Contractor shall submit to the Engineer a complete list of items for which shop drawings and/or equipment data are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specified items. Review of this list by the Engineer shall in no way, expressed or implied, relieve the Contractor from submitting complete shop drawings and/or equipment data and providing materials, equipment, etc., fully in accordance with the Specifications.
3. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:
 - a. Submittal Description and assigned Submittal Number
 - b. Date Submitted to Engineer
 - c. Date Received Back from Engineer
 - d. Status of Submittal (Approved, Approved as Noted, Not Approved/Resubmit)
 - e. Date of Re-submittal and Return (as applicable)
 - f. Date Equipment Released for Fabrication/Delivery
 - g. Projected Date of Fabrication
 - h. Projected Date of Delivery to Site
 - i. Status of O&M Manuals Submittal

1.02 CONTRACTOR'S RESPONSIBILITY

- A. It is the responsibility of the Contractor to check all drawings, data and samples prepared before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings and/or equipment data submitted to the Engineer without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents. If the Contractor takes exception to the

specifications, the Contractor shall note the exception in the letter of transmittal to the Engineer.

- B. Determine and verify:
 - 1. Field measurements
 - 2. Field construction criteria
 - 3. Catalog numbers and similar data
 - 4. Conformance with Specifications
- C. The Contractor shall furnish the Engineer a schedule of submittals with the expected dates for the submissions of shop drawings and/or equipment data and the expected time for fabrication and delivery. This schedule shall indicate those that are critical to the construction schedule.
- D. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him/her, by the Engineer, with approval.
- E. The Contractor shall submit to the Engineer all drawings and schedules sufficiently in advance of construction requirements to provide no less than thirty (30) calendar days for reviewing and approval/disapproval from the time the Engineer receives them.
- F. All submittals shall be accompanied with a transmittal letter prepared in duplicate containing the following information:
 - 1. Date
 - 2. Project Title and Number
 - 3. Contractor's Name and Address
 - 4. The number of each Shop Drawings Submitted
 - 5. Notification of Deviations from Contract Documents
 - 6. Submittal Log Number Referencing the Specification Section Number
- G. The Contractor shall submit electronic copies (PDF) of equipment or product data information and shop drawings.
- H. The Contractor shall be responsible for and bear all costs of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by Engineer of the necessary shop drawings and/or equipment data.
- I. The Contractor shall be fully responsible for observing the need for and making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the materials/equipment he proposed to supply both as pertains to his own work and any work affected under other parts, headings, or divisions of drawings and specifications.

- J. The Contractor shall not use shop drawings as a means of proposing alternate items to demonstrate compliance with the Drawings and Specifications.

1.03 ENGINEER'S REVIEW OF SUBMITTALS

- A. The review by the Engineer of shop drawings, equipment data, and samples submitted by the Contractor will cover only general conformity to the Specifications, external connections, and dimensions which affect the installation. The Engineer's review and exceptions, if any, will not constitute an approval of dimensions, quantities, and details of the material, equipment, device, or item shown.
- B. The review of shop drawings, equipment data, schedules, and/or O&M data will be general, and shall not be construed:
 - 1. as permitting any departure from the Contract requirements;
 - 2. as relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;
 - 3. as approving departures from details furnished by the Engineer, except as otherwise provided herein.
- C. If the drawings or schedules as submitted describe variations and show a departure from the Contract requirements which the Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.
- D. When reviewed by the Engineer, each of the submittals will be identified as having received such review being so stamped and dated. Submittals stamped "APPROVED AS NOTED" or "DISAPPROVED, REVISE AND RESUBMIT" and with required corrections shown will be returned to the Contractor for correction and re-submittal.
- E. Re-submittals will be handled in the same manner as first submittals. On re-submittals the Contractor shall direct specific attention, in writing or on resubmitted shop drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall address and make any corrections required by the Engineer.
- F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.
- G. Shop drawings and other submittal data shall be reviewed by the Engineer for each original submittal and for the first re-submittal. Thereafter, review time for subsequent re-submittals shall be charged to the Contractor in accordance with the terms of the Engineer's Agreement with the Owner.
- H. When the shop drawings and/or equipment data have been approved or approved as noted by the Engineer, the Contractor shall carry out the construction in accordance

therewith and shall make no further changes therein except upon written instructions from the Engineer.

- I. No partial submittals will be reviewed. Submittals not complete will be returned to the Contractor for re-submittal.
- J. All drawings, schematics, manufacturer's product data, certifications and other shop drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interface checking.

1.04 SHOP DRAWINGS AND/OR EQUIPMENT DATA

- A. Shop drawings shall be complete and detailed and shall consist of fabrication, erection, and setting drawings, manufacturer's scaled drawings, and wiring and control diagrams.
- B. Equipment data shall include manufacturer's catalog sheets, brochures, diagrams, illustrations and other standard descriptive data and shall be clearly marked to identify pertinent materials, products or models.
 - 1. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the work in accordance with the Contract, even though such drawings have been reviewed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

**SECTION 01310
CONSTRUCTION PROGRESS SCHEDULES**

1.01 SUBMITTALS

A. Informational Submittals:

1. Preliminary Progress Schedule: Submit within time specified in the General Conditions.
2. Detailed Progress Schedule:
 - a. Submit initial Detailed Progress Schedule within 30 days following the Notice to Proceed date or 10 days before submission of the first Application for Payment, whichever shall first occur.
 - b. Submit an Updated Progress Schedule in accordance with Paragraph 1.03, Detailed Progress Schedule.
3. Submit with each Progress Schedule submission: Contractor's certification that Progress Schedule submission is actual schedule being utilized for execution of the Work.
 - a. Disk file compatible with latest version of Project Planner (P3) by Primavera Systems, Inc. unless otherwise approved by Engineer.
 - b. Progress Schedule: Five legible copies.
 - c. Narrative Progress Report: Same number of copies as specified for Progress Schedule.
4. Prior to final payment, submit a final Updated Progress Schedule.

1.02 PRELIMINARY PROGRESS SCHEDULE

- A. In addition to basic requirements outlined in the General Conditions, show a detailed schedule, beginning with Notice to Proceed, for minimum duration of 90 days, and a summary of balance of Project through Final Completion.
- B. Show activities including, but not limited to the following:
 1. Notice to Proceed
 2. Permits
 3. Submittals including review time. Contractor may use Schedule of Submittals specified in Section 01300, Submittals.
 4. Early procurement activities for long lead equipment and materials
 5. Mobilization
 6. Initial Site work
 7. Earthwork

8. Specified Work sequences and construction constraints
 9. Contract Milestone and Completion Dates
 10. Owner-furnished products delivery dates or ranges of dates
 11. Major structural, mechanical, equipment, electrical, architectural, and instrumentation and control Work
 12. System startup summary
 13. Project close-out summary
 14. Demobilization summary
- C. Update Preliminary Progress Schedule monthly as part of progress payment process. Failure to do so may result in the Owner withholding all or part of the monthly progress payment until the Preliminary Progress Schedule is updated in a manner acceptable to Engineer.
- D. Format: In accordance with Article 1.04: Progress Schedule—Critical Path Network

1.03 DETAILED PROGRESS SCHEDULE

- A. In addition to requirements of General Conditions, submit Detailed Progress Schedule beginning with Notice to Proceed and continuing through Final Completion.
- B. Show the duration and sequences of activities required for complete performance of the Work reflecting means and methods chosen by Contractor.
- C. When accepted by Engineer, Detailed Progress Schedule will replace Preliminary Progress Schedule and become Baseline Schedule. Subsequent revisions will be considered as Updated Progress Schedules.
- D. Format: In accordance with Article 1.04: Progress Schedule—Critical Path Network
- E. Update monthly to reflect actual progress and occurrences to date, including weather delays.

1.04 PROGRESS SCHEDULE-CRITICAL PATH NETWORK

- A. General: Comprehensive computer-generated schedule using CPM, generally as outlined in Associated General Contractors of America (AGC) 580, "Construction Project Planning and Scheduling Guidelines." If a conflict occurs between the AGC publication and this Specification, this Specification shall govern.
- B. Contents:
 1. Schedule shall begin with the date of Notice to Proceed and conclude with the date of Final Completion.
 2. Identify Work calendar basis using days as a unit of measure.

3. Show complete interdependence and sequence of construction and Project-related activities reasonably required to complete the Work.
4. Identify the Work of separate stages and other logically grouped activities, and clearly identify critical path of activities.
5. Reflect sequences of the Work, restraints, delivery windows, review times, Contract Times and Project Milestones set forth in the Agreement and Section 01041: Project Coordination.
6. Include as applicable, at a minimum:
 - a. Obtaining permits, submittals for early product procurement, and long lead time items
 - b. Mobilization and other preliminary activities
 - c. Initial Site work
 - d. Specified Work sequences, constraints, and Milestones, including Substantial Completion date(s) Subcontract Work
 - e. Major equipment design, fabrication, factory testing, and delivery dates
 - f. Delivery dates for Owner-furnished products, as specified in Section 01010: Summary of Work
 - g. Site Work
 - h. Concrete Work
 - i. Structural steel Work
 - j. Architectural features Work
 - k. Conveying systems Work
 - l. Equipment Work
 - m. Mechanical Work
 - n. Electrical Work
 - o. Instrumentation and control Work
 - p. Interfaces with Owner-furnished equipment
 - q. Other important Work for each major facility
 - r. Equipment and system startup and test activities
 - s. Project closeout and cleanup
 - t. Demobilization
7. No activity duration, exclusive of those for Submittals review and product fabrication/delivery, shall be less than 1 day or more than 30 days, unless otherwise approved.
8. Activity duration for Submittal review shall not be less than review time specified unless clearly identified and prior written acceptance has been obtained from Engineer.
9. Contractor shall include a mandatory 30 days, minimum float time for utility relocation work. County will not consider Contract Time extensions related to utility coordination matters unless the utility related delays exceed the 30 days float time and extend the critical path of the Project Schedule.

C. Network Graphical Display:

1. Plot or print on paper not greater than 30 inches by 42 inches or smaller than 22 inches by 34 inches, unless otherwise approved
2. Title Block: Show name of Project, Owner, date submitted, revision or update number, and the name of the scheduler. Updated schedules shall indicate data date
3. Identify horizontally across top of schedule the time frame by year, month, and day
4. Identify each activity with a unique number and a brief description of the Work associated with that activity
5. Indicate the critical path
6. Show, at a minimum, the controlling relationships between activities
7. Plot activities on a time-scaled basis, with the length of each activity proportional to the current estimate of the duration
8. Plot activities on an early start basis unless otherwise requested by Engineer
9. Provide a legend to describe standard and special symbols used

D. Schedule Report:

1. On 8-1/2-inch by 11-inch white paper, unless otherwise approved.
2. List information for each activity in tabular format, including, at a minimum:
 - a. Activity Identification Number
 - b. Activity Description
 - c. Original Duration
 - d. Remaining Duration
 - e. Early Start Date (Actual start on Updated Progress Schedules)
 - f. Early Finish Date (Actual finish on Updated Progress Schedules)
 - g. Late Start Date
 - h. Late Finish Date
 - i. Total Float
3. Sort reports, in ascending order, as listed below:
 - a. Activity number sequence with predecessor and successor activity
 - b. Early-start
 - c. Total float

1.05 PROGRESS OF THE WORK

A. Updated Progress Schedule shall reflect:

1. Progress of Work to within 5 working days prior to submission
2. Approved changes in Work scope and activities modified since submission
3. Delays in Submittals or resubmittals, deliveries, or Work

4. Adjusted or modified sequences of Work
 5. Other identifiable changes
 6. Revised projections of progress and completion
 7. Report of changed logic
- B. Produce detailed sub-schedules during Project, upon request of Owner or Engineer, to further define critical portions of the Work such as facility shutdowns.
- C. If Contractor fails to complete activity by its latest scheduled completion date and this Failure is anticipated to extend Contract Times (or Milestones), Contractor shall, within 7 days of such failure, submit a written statement as to how Contractor intends to correct nonperformance and return to acceptable current Progress Schedule. Actions by Contractor to complete the Work within Contract Times (or Milestones) will not be justification for adjustment to Contract Price or Contract Times.
- D. Owner may order Contractor to increase plant, equipment, labor force or working hours if Contractor fails to:
1. Complete a Milestone activity by its completion date
 2. Satisfactorily execute Work as necessary to prevent delay to overall completion of Project, at no additional cost to Owner

1.06 NARRATIVE PROGRESS REPORT

- A. Format:
1. Organize same as Progress Schedule
 2. Identify, on a cover letter, reporting period, date submitted, and name of author of report
- B. Contents:
1. Number of days worked over the period, work force on hand, construction equipment on hand (including utility vehicles such as pickup trucks, maintenance vehicles, stake trucks)
 2. General progress of Work, including a listing of activities started and completed over the reporting period, mobilization/demobilization of subcontractors, and major milestones achieved
 3. Contractor's plan for management of Site (for example, lay down and staging areas, construction traffic), utilization of construction equipment, buildup of trade labor, and identification of potential Contract changes
 4. Identification of new activities and sequences as a result of executed Contract changes
 5. Documentation of weather conditions over the reporting period, and any resulting impacts to the Work

6. Description of actual or potential delays, including related causes, and the steps taken or anticipated to mitigate their impact
7. Changes to activity logic
8. Changes to the critical path
9. Identification of, and accompanying reason for, any activities added or deleted since the last report
10. Steps taken to recover the schedule from Contractor-caused delays

1.07 SCHEDULE ACCEPTANCE

A. Engineer's acceptance will demonstrate agreement that:

1. Proposed schedule is accepted with respect to:
 - a. Contract Times, including Final Completion and all intermediate Milestones are within the specified times
 - b. Specified Work sequences and constraints are shown as specified
 - c. Specified Owner-furnished Equipment or Material arrival dates, or range of dates, are included
 - d. Access restrictions are accurately reflected
 - e. Startup and testing times are as specified
 - f. Submittal review times are as specified
 - g. Startup testing duration is as specified and timing is acceptable
2. In all other respects, Engineer's acceptance of Contractor's schedule indicates that, in Engineer's judgement, schedule represents reasonable plan for constructing Project in accordance with the Contract Documents. Engineer's review will not make any change in Contract requirements. Lack of comment on any aspect of schedule that is not in accordance with the Contract Documents will not thereby indicate acceptance of that change, unless Contractor has explicitly called the nonconformance to Engineer's attention in submittal. Schedule remains Contractor's responsibility and Contractor retains responsibility for performing all activities, for activity durations, and for activity sequences required to construct Project in accordance with the Contract Documents.

B. Unacceptable Preliminary Progress Schedule:

1. Make requested corrections; resubmit within 10 days.
2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process, during which time Contractor shall update schedule on a monthly basis to reflect actual progress and occurrences to date.

C. Unacceptable Detailed Progress Schedule:

1. Make requested corrections; resubmit within 10 days.

2. Until acceptable to Engineer as Baseline Progress Schedule, continue review and revision process.
- D. Narrative Report: All changes to activity duration and sequences, including addition or deletion of activities subsequent to Engineer's acceptance of Baseline Progress Schedule, shall be delineated in Narrative Report current with proposed Updated Progress Schedule.

1.08 ADJUSTMENT OF CONTRACT TIMES

- A. In accordance with the General Conditions
- B. Evaluation and reconciliation of Adjustments of Contract Times shall be based on the Updated Progress Schedule at the time of proposed adjustment or claimed delay.
- C. Schedule Contingency:
1. Contingency, when used in the context of the Progress Schedule, is time between Contractor's proposed Completion Time and Contract Completion Time.
 2. Contingency included in Progress Schedule is a Project resource available to both Contractor and Owner to meet Contract Milestones and Contract Times. Use of Schedule contingency shall be shared to the proportionate benefit of both parties.
 3. Use of schedule contingency suppression techniques such as preferential sequencing and extended activity times is prohibited.
 4. Pursuant to Contingency sharing provisions of this Specification, no time extensions will be granted, nor will delay damages be paid until a delay occurs which (i) consumes all available contingency time, and (ii) extends Work beyond the Contract Completion date.
- D. Float:
1. In accordance with the General Conditions
- E. Claims Based on Contract Times:
1. Where Engineer has not yet rendered formal decision on Contractor's Claim for adjustment of Contract Times, and parties are unable to agree as to amount of adjustment to be reflected in Progress Schedule, Contractor shall reflect an interim adjustment in the Progress Schedule as acceptable to Engineer.
 2. It is understood and agreed that such interim acceptance will not be binding on either Contractor or Owner, and will be made only for the purpose of continuing to schedule Work until such time as formal decision has been rendered as to an adjustment, if any, of the Contract Times.
 3. Contractor shall revise Progress Schedule prepared thereafter in accordance with Engineer's formal decision.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01370
SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Submit to the Engineer a Schedule of Values allocated to the various lump sum portions of the Work, at the Pre-Construction Conference, and as otherwise specified or requested to be submitted earlier as evidence of the Apparent Low Bidder's qualifications.
2. Upon request of the Engineer support the values with data which will substantiate their correctness. The data shall include, but not be limited to quantity of materials, all sub-elements of the activity, and their units of measure. The format of the pay application submitted by the Contractor shall be the similar format as the approved Schedule of Values.
3. The Schedule of Values shall establish the actual value for each activity of the Work to be completed taken from the approved Critical Path Method (CPM) Construction Schedule, and shall be used as the basis for the Contractor's Applications for Payment.

B. Related Requirements Described Elsewhere:

1. Conditions of the Construction Contract

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Type schedule on 8-1/2 inch x 11 inch white paper. Contractor's standard forms and computer printouts may be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of project and location
2. Owner and purchase order number
3. Engineer and project number
4. Name and address of Contractor

5. Contract designation
 6. Date of submission
- B. Schedule shall list the installed value of the component parts of the Work in sufficient detail to serve as a basis for computing item prices for progress payments during construction.
 - C. Identify each line item with the number and the title of the respective section of the Specifications.
 - D. For each major item of the Work, list sub-values of major products or operations under the major item.
 - E. For the various portions of the Work:
 1. The amount for each item shall reflect a total installed cost including a directly proportional amount of the Contractor's overhead and profit.
 2. For items on which progress payments will be requested for stored materials, break down the value into:
 - a. The cost of the materials, delivered and unloaded, with taxes paid. Paid invoices are required for materials. Payment for materials shall be limited to the invoiced amount only.
 - b. The total installed value.
 - F. Round off figures to nearest dollar amount.
 - G. The sum of the costs of all items listed in the schedule shall equal the total Contract Price.
 - H. For each item which has an installed value of more than \$15,000, provide a breakdown of costs to list major products or operations under each item.
 - I. The form of the Schedule of Values shall parallel the form presented in Table 01370-1. As a minimum, the Contractor shall provide a contract value for all of the items listed in Table 01370-1. The Contractor may add additional items for convenience of pay request approvals.

1.03 SUB-SCHEDULE OF UNIT MATERIAL VALUES

- A. Submit a separate schedule of unit prices for materials to be stored on-site and for those materials incorporated into the Work for which progress payments will be requested.
- B. The unit values for the materials shall be broken down into:
 - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
 - 2. Copies of paid invoices for component material shall be included with the payment request in which the material first appears.
- C. Only materials unique to the project may be billed when stored on site. Materials of standard use such as conduit, wire, small-diameter pipe, steel, etc., shall not be accepted for payment.
- D. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

1.04 REVIEW AND RESUBMITTAL

- A. After review by Engineer, revise and resubmit Schedule of Values and Schedule of Unit Material Values as required.
- B. Resubmit revised schedules in same manner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

TABLE 01370-1
SAMPLE SCHEDULE OF VALUES (EXAMPLE)

- I. General Requirements
 - Mobilization/Demobilization
 - Bonds and Insurance
 - Permitting
 - Project Record Documents
 - Indemnification
 - Preconstruction Audio-Visual Documentation and Construction Photographs

- II. Site Improvements
 - Construction Survey
 - Clear and Grub
 - Excavation
 - Fill
 - Dewatering
 - Unsuitable Materials Excavation and Disposal
 - Finish Grading
 - Sodding
 - Seeding and Mulching
 - Concrete Driveways
 - Sidewalks
 - Miscellaneous Concrete Slabs
 - Erosion and Sedimentation Control
 - Paved Access Road
 - Stabilized Access Rd
 - Access Gates
 - Chain Link Fence
 - Operations Building

- III. Potable Water Storage and Repump
 - PW Ground Storage Tank
 - PW - 1 + 2 High Service Pumps w Inv Duty Motors
 - PW - 3 + 4 High Service Pumps w Inv Duty Motors
 - PW Pump Room Piping, Valves and Equipment

- IV. Reclaimed Water Storage and Repump
 - RW Ground Storage Tank
 - RW High Service Pumps w Inv Duty Motors
 - RW Pump Room Piping, Valves and Equipment

- V. Chemical Bulk Storage and Feed System
 - Hypochlorite Bulk Storage Tanks and Equipment

- Metering Pump Skid

VI. Yard Piping and Transmission Mains

- 36-inch Transmission Main and Yard Piping
- 36-inch Fittings
- 36-inch Butterfly Valves
- 36-inch Gate Valves
- 30-inch Yard Piping
- 30-inch Fittings
- 30-inch Butterfly Valves
- 30-inch Gate Valves
- 24-inch Transmission Main and Yard Piping
- 24-inch Fittings
- 24-inch Butterfly Valves
- 24-inch Gate Valves
- 24-inch Flow Control Valve
- 20-inch Piping and Fittings
- 20-inch Butterfly Valves
- 20-inch Mag Meter
- 16-inch Piping
- 16-inch Fittings
- 16-inch Flow Control Valve
- 16-inch Mag Meter
- 12-inch Gate Valves
- 4-inch Force Main
- Wastewater Lift Station
- Fire Hydrants
- Storm Sewers
- Storm Sewer Structures
- Manholes
- Sanitary Sewers
- Miscellaneous Piping, Fittings and Valves

VII. Electrical & Instrumentation

- Electrical
- Instrumentation, Controls and SCADA

VII. Other Items not previously listed

END OF SECTION

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SECTION 01380
AUDIO-VISUAL DOCUMENTATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

- A. Scope of Work: The Contractor shall have a competent photographer take construction record photographs prior to start of work and periodically during the course of the Work. The Contractor shall also provide the Owner with regularly documented audio-visual records of the Construction process from the existing conditions through final completion.
- B. Related Requirements Described Elsewhere:
 - 1. General Requirements: Section 01001
 - 2. Summary of Work: Section 01010
 - 3. Project Record Documents and Survey: Section 01720

1.02 PHOTOGRAPHY REQUIRED

- A. Photographs taken in conformance with this Section shall be furnished to the Engineer with each pay request.
- B. Photographs shall be taken at each of the major stages of construction and as directed by the Engineer.
- C. Photographs may be taken by the Contractor's personnel but must be of professional quality as herein specified. Photographs deemed unsatisfactory will be rejected and retakes will be required.
- D. Views and Quantities Required:
 - 1. Six (6) digital photos of one (1) view of each activity as directed by the Resident Project Representative, up to a limit of ten activities photographed per month.
 - 2. Six (6) digital photos of five (5) views of overall Project site monthly, as directed by the Resident Project Representative.
 - 3. Take aerial photographs of the site prior to construction, during critical stages of construction (at least monthly) and after final completion.

1.03 PRE-CONSTRUCTION VIDEO REQUIREMENTS INCLUDED

- A. The Contractor shall employ a professional videographer to take a Pre-Construction video of the entire site including the areas of adjacent properties within 100-feet of the limits of Work and shall be made within 30-days of Work beginning. Special attention shall be made to show the existing paved roads, shoulders, signs, and other existing features.
- B. The Contractor shall submit a quality audio-video recording documenting Pre-Construction field conditions for the entire project. When the Work includes construction of water, wastewater, reuse, or other lines in the vicinity of any street or road, the Contractor shall take digital audio-video recordings of existing conditions along both sides of the street or road. The Pre-Construction video shall be submitted to the Owner and accepted prior to commencing any Work or using any Contractor laydown areas.
- C. Electronic digital photography shall also be used as necessary to record and facilitate resolution of on-site issues through the transmission of electronic photographs by e-mail from the site to the Professional's and Owner's offices.

1.04 COST OF PHOTOGRAPHY

- A. The Contractor shall pay costs for specified photography and prints. Parties requiring additional photography or prints will pay the photographer directly.

PART 2 - PRODUCTS

2.01 AUDIO-VIDEO RECORDING

- A. Each audio-video recording shall be saved on appropriate DVD media viewable on standard DVD players or computer.
- B. Each DVD shall contain the following information and arrangement at the beginning as a title screen:
 - Orange County, Florida
 - PROJECT NAME
 - PROJECT NUMBER
 - CONTRACTOR: (Name of Contractor)
 - DATE: (When photo was taken)
 - VIDEO BY: (Firm Name of Videographer)
 - LOCATION: (Description of Location(s) and View(s))
- C. Each DVD recording section shall begin with an audio description of the Owner's name, Contract name and number, Contractor's name, date and location information such as street name, direction of travel, viewing side, etc.

- D. Information appearing on the video recording must be continuous and run simultaneously by computer generated transparent digital information. No editing or overlaying of information at a later date will be acceptable.
- E. Digital information to appear in the upper left corner shall be as follows:
 - 1. Name of Contractor
 - 2. Day, date and time
 - 3. Name of Project & Specification Number
- F. Time must be accurate and continuously displayed on the video record
- G. Written documentation must coincide with the information on the DVD so as to make easy retrieval of locations at a later date.
- H. The video system shall have the capability to transfer individual frames of video electronically into hard copy prints or photographic negatives.
- I. Audio shall be recorded at the same time as the video recording and shall have the same information as on the viewing screen. Special commentary shall be given for unusual conditions of buildings, sidewalks and curbing, foundations, trees and shrubbery, structures, equipment, pavement, etc.
- J. All DVDs and boxes shall bear labels with the following information:
 - 1. DVD Number
 - 2. County's Name
 - 3. Date of Recording
 - 4. Project Name and Number
 - 5. Location and Standing Limit of Video

2.02 CONSTRUCTION PHOTOGRAPHS

- A. The Contractor shall employ a competent photographer to take construction record photographs periodically during the course of the Work.
- B. Prints: Date imprinted 8-inch x 10-inch high resolution glossy single weight color print paper; 5 sets, bound in 3-ring binders to be provided to the Owner with each respective Application for Payment and distributed by the Owner as follows:
 - 1. Owner (2 sets)
 - 2. Engineer (1 set)
 - 3. Contractor (1 set)
 - 4. Project Record Data (1 set stored by Contractor to be furnished to Owner upon Closeout)

2.03 PRINTS

- A. Full color
- B. Finish: Smooth surface, glossy
- C. Minimum Size: 4 in x 6 in for all views
- D. Paper Weight: Single weight, neutral, image tone, white base
- E. Mounting: In plastic sheets in loose leaf, three ring binders
- F. Provide a CD with electronic photo files. Furnish a file index that lists photo No. or file name and description of view

2.04 IDENTIFICATION

- A. Identify each print on back.
 - 1. Name of project
 - 2. Phase
 - 3. Name of contractor
 - 4. Description of view/orientation
 - 5. Time and date of exposure
 - 6. Name and address of photographer
 - 7. Photographer's numbered identification of exposure

PART 3 - EXECUTION

3.01 TECHNIQUE

- A. Factual Presentation
- B. Correct exposure and focus
 - 1. High resolution and sharpness
 - 2. Maximum depth-of-field
 - 3. Minimum distortion

3.02 VIDEO VIEWS REQUIRED

- A. Complete coverage shall include all surface features within 100-feet of the Work area to be used by the Contractor and shall be supported by appropriate audio description made simultaneously with video coverage. Such coverage shall include, but not be

limited to, all existing driveways, sidewalks, curbs, ditches, roadways, landscaping, trees, culverts, headwalls, and retaining walls, equipment, structures, pavements, manholes, vaults, handrails, etc. located within the work zone. Video coverage shall extend to the maximum height of all structures within this zone.

- B. The video recorder shall take special efforts to point out and provide audio commentary on cracking, breakage, damage, and other defects in existing features.
- C. All video recording shall be done during times of good visibility. No video recording shall be done during periods of visible precipitation, or when more than 10% of the ground area is covered with standing water, unless otherwise authorized by Owner.
- D. Prior to commencement of audio-video recording, the Contractor shall notify the Owner in writing within 48-hours of the audio-video recording. The Owner may provide a designated representative to accompany and observe all video recording operations. Audio-video recording completed without an Owner Representative present will be unacceptable unless specifically authorized by the Owner.

3.03 AUDIO-VIDEO REQUIREMENTS

A. Major Locations:

1. The Contractor shall provide color digital video of each major facility and structures and facilities adjacent to the Construction before construction starts.
2. All videos shall be recorded with character generator operating with date, time, and location on screen. During video recording, the Contractor shall narrate video explaining what is being shown. All master videos shall be delivered to the Owner.
3. The audio and video portions of the recording shall maintain viewer orientation. To this end, overall establishing views of all visible house and business addresses shall be used. In areas where the proposed construction location will not be readily apparent to the video recording viewer, highly visible yellow flags shall be placed, by the Contractor, in such a fashion as to clearly indicate the proposed centerline of Construction. When conventional wheeled vehicles are used as conveyances for the recording system, the vertical distance between the camera lens and the ground shall not exceed 10-feet. The camera shall be firmly mounted such that transport of the camera during the recording process will not cause an unsteady picture.
4. All video recording shall be done during time of good visibility. No video recording shall be done during precipitation, mist or fog. The recording shall only be done when sufficient sunlight is present to properly illuminate the subjects of recording and to produce bright, sharp video recordings of those subjects.
5. The average rate of travel during a particular segment of coverage shall be directly proportional to the number, size and value of the surface features within that construction area's zone of influence. The rate of speed in the

general direction of travel of the vehicle used during taping shall not exceed 44-feet per minute.

3.04 PHOTOGRAPHS

- A. A minimum of 3 views (top, upstream, and downstream) each shall generally be taken prior to backfilling pipelines or structures. Photographs shall be provided for:
 - 1. Utility conflicts/relocations
 - 2. Manholes
 - 3. Pump stations
 - 4. Boring and jacking
 - 5. Directional drilling pipe entrance and exit
 - 6. Valve installation
 - 7. Air release valve installation
 - 8. Fire hydrant assembly
- B. Photo Identification
 - 1. Name of Project
 - 2. Name of Structure
 - 3. Orientation of View
 - 4. Date & Time of Exposure
 - 5. Film numbered identification of exposure

3.05 DELIVERY OF PRINTS

- A. Deliver prints and/or CDs monthly to accompany each Application for Payment.
- B. Distribution of construction prints as soon as processed is anticipated to be as follows:
 - 1. Owner (two (2) sets)
 - 2. Engineer (two (2) sets)
 - 3. Project record file (one (1) set to be stored by Contractor until the end of the project which shall be delivered with Project Record Documents as specified in Section 01720)
 - 4. Contractor (one (1) set)

END OF SECTION

1 **SECTION 01410**

2 **TESTING AND TESTING LABORATORY SERVICES**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. Scope of Work:

6 1. County will employ, and pay for services of an Independent Testing Laboratory to
7 perform Testing specifically indicated on the Contract Documents or specified in the
8 Specifications and may at any other time elect to have materials and equipment tested for
9 conformity with the Contract Documents.

10 2. Contractor shall cooperate with the laboratory to facilitate the execution of its
11 required services.

12 3. Employment of laboratory by County shall in no way relieve Contractor's obligations
13 to perform the Work.

14 B. Related Requirements Described Elsewhere:

15 1. Conditions of the Contract.

16 2. Respective section of Specifications: Certification of products.

17 3. Each Specification section listed: Laboratory tests required, and standards for testing.

18 1.02 CONTRACTOR'S RESPONSIBILITIES

19 A. Cooperate with County's personnel; provide access to work and manufacturer's operations.

20 B. Secure and deliver to the County adequate representational samples of materials proposed
21 to be used and which require testing.

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

24 D. Materials and equipment used in the performance of work under this Contract are subject to
25 inspection and testing at the point of manufacturer or fabrication. The County may require
26 the Contractor to provide statements or certificates from the manufacturers and fabricators that
27 the materials and equipment provided by them are manufactured or fabricated in full
28 accordance with the standard specifications indicated in the Contract Documents. All costs of
29 this testing and providing statements and certificates shall be a subsidiary obligation of the
30 Contractor, and no extra charge to the County shall be allowed on account of such testing and
31 certification.

32 E. Contractor shall not have direct contact with laboratory or laboratory personnel. All
33 testing shall be coordinated through County.

34 F. Furnish incidental labor and facilities:

- 1 1. To provide access to work to be tested.
- 2 2. To obtain and handle samples at the Project site or at the source of the product to be
- 3 tested.
- 4 3. To facilitate inspections and tests.
- 5 4. For storage and curing of test samples which may include curing boxes or whatever is
- 6 needed to maintain standards.

7 G. Notify County sufficiently in advance of operations to allow for laboratory assignment of
 8 personnel and scheduling of tests. When tests or inspections cannot be performed after such
 9 notice, reimburse County for laboratory personnel and travel expenses incurred due to
 10 Contractor's negligence. The following field testing schedule summarizes the responsibilities
 11 of various tests that may be required by the Contract Documents.

12

TEST	NOTES	PAID FOR
Soil Compaction	A. Pipe Work: Every 300 ft. at each lift of compaction B. Structures: As a minimum one test per 2000 SF of fill area per lift, or at least 2 tests per structure per lift as specified in material specifications sections	County
Low Pressure Air Exfiltration	Each section of gravity sewer pipe between manholes or lift station	Contractor
Hydrostatic Pressure	All segments of pressure piping (24-hour test).	Contractor
Hydrostatic Leakage	All segments of pressure piping (2-hour test).	Contractor
Bacteriological	As required by local and state agencies	County
Asphaltic Concrete Paving	As required by or per specifications	County
LBR	Each 600 SY of pavement or as per specifications	County
Concrete	Slump test each delivery, cylinders every 20 CY or per specifications	County
Asbestos	Environmental testing of materials	County
All Other Testing	As specified in various sections of the Project Manual	As Indicated

13 H. Employ and pay for the services of the same or a separate, equally qualified independent
 14 testing laboratory to perform additional inspections, sampling and testing required for the
 15 Contractor's convenience.

16 I. If the test results indicate the material or equipment complies with the Contract
 17 Documents, the County shall pay for the cost of the testing laboratory. If the tests and any
 18 subsequent retests indicate the materials and equipment fail to meet the requirements of the
 19 Contract Documents, the Contractor shall pay for the laboratory costs of all test that does not
 20 pass required specifications directly to the County or the total costs shall be deducted from
 21 any payments due to the Contractor.

1 **PART 2 - PRODUCTS (NOT USED)**

2 **PART 3 - EXECUTION (NOT USED)**

3
4

END OF SECTION

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**SECTION 01505
MOBILIZATION**

PART 1 - GENERAL

1.01 DEFINITION AND SCOPE

- A. Mobilization shall include the obtaining of all permits, insurance, and bonds; moving onto the site of all equipment; temporary buildings and other construction facilities; all as required for the proper performance and completion of the Work. Mobilization shall include, but not be limited to the following:
1. Move onto the site all Contractor's equipment required for the first month's operations.
 2. Install temporary construction power, wiring and lighting facilities.
 3. Establish fire protection plan and safety program.
 4. Secure construction water supply.
 5. Provide on-site sanitary facilities and potable water facilities as specified.
 6. Arrange for and erect Contractor's work and storage yard and employee's parking facilities.
 7. Submit all required insurance certificates and bonds.
 8. Obtain all required permits.
 9. Post all OSHA, EPA, Department of Labor and all other required notices.
 10. Have Contractor's superintendent at the job site full time.
 11. Submit a detailed construction CPM schedule acceptable to the Engineer as specified.
 12. Submit a schedule of values of the work.
 13. Submit a schedule of submittals.

1.02 DEMOBILIZATION

- A. Demobilization is the timely and proper removal of all Contractor owned material, or equipment, from the jobsite and the proper restoration or completion of work necessary to bring the site into full compliance with the contract documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

1 **SECTION 01570**

2 **MAINTENANCE OF TRAFFIC**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 This section includes identifying safety hazards and then furnishing all necessary labor,
6 materials, tools, and equipment including, but not limited, to signs, barricades, traffic drums,
7 cones, flashers, construction fencing, flag persons, warning devices, temporary pavement
8 markings, delineators, etc., to control vehicular and pedestrian traffic through and adjacent to
9 the project area. These measures and actions shall be taken to safely maintain the
10 accessibility of public and construction traffic by preventing potential construction hazards.
11 This Work shall also include all costs associated with the erecting, maintaining, moving,
12 adjusting, cleaning, relocating, and storing the materials necessary to ensure safe movement
13 of vehicular and pedestrian traffic throughout the project area. The Contractor may request
14 that the County approve the detouring of traffic around the Construction area if it is in the
15 best interest of public safety and the County. Detouring shall be limited to normal
16 construction hours and two-way traffic patterns shall be re-established at the end of each
17 workday.

18 1.02 REQUIREMENTS

- 19 A. Traffic planning and control for the maintenance and protection of pedestrian and
20 vehicular traffic affected by the Contractor's Work includes, but is not limited to:
- 21 1. Construction and maintenance of any necessary detour equipment and facilities.
 - 22 2. Providing necessary facilities for access to residences and businesses.
 - 23 3. Furnishing, installing, and maintenance of traffic control and safety devices (e.g.
24 signage, barricades, barriers, message boards, etc.), and flag persons as appropriate
25 during Construction.
 - 26 4. Control of water runoff, dust and any other special requirements for safe and
27 expeditious movement of traffic.
- 28 B. Planning, maintenance and control of traffic shall be provided at the Contractor's
29 expense. The Contractor will bear all expense of maintaining the vehicle and pedestrian
30 traffic throughout the work area.
- 31 C. The Contractor will ensure all personnel involved in traffic control are properly trained
32 and capable of communicating with the public during closures and detours. The
33 Contractor may be required to hire off-duty uniformed police officers, in addition to flag
34 persons, to direct and maintain traffic on heavily traveled thoroughfares on which traffic
35 is subject to delays or detours caused by the Contractor's operations. Locations and
36 conditions requiring such uniformed police officers shall be as directed by the County.

1 D. The Contractor will remove temporary equipment and facilities when no longer required,
2 restore grounds to original, or to specified conditions.

3 1.03 SUBMITTALS

4 A. Submit at Contractor's own expense a Traffic Control Plan for approval by the County.
5 Sequence the Work in a manner that will minimize disruption of vehicular and pedestrian
6 access through and around the construction area.

7 B. The Traffic Control Plan will detail procedures and protective measures proposed by the
8 Contractor to provide for protection and control of traffic affected by the Work consistent
9 with the following applicable standards:

- 10 1. Standard Specifications for Road and Bridge Construction, latest edition including all
11 subsequent supplements issued by the Florida Department of Transportation, (FDOT
12 Spec.).
- 13 2. Manual of Traffic Control and Safe Practices for Street and Highway Construction,
14 Maintenance and Utility Operations, FDOT.
- 15 3. Right-of-Way Utilization Regulations, Orange County, Florida, latest edition.

16 C. All references to the respective agencies in the above referenced standards shall be
17 construed to also include the municipality as applicable for this Work.

18 D. The Traffic Control Plan will be signed and sealed by a Professional Engineer registered
19 in the state of Florida and shall include proposed locations and time durations of the
20 following, as applicable:

- 21 1. Pedestrian and public vehicular traffic routing.
- 22 2. Lane and sidewalk closures, other traffic blockage and lane restrictions and
23 reductions anticipated to be caused by construction operations. Show and describe
24 the proposed location, dates, hours and duration of closure, vehicular and pedestrian
25 traffic routing and management, traffic control devices for implementing pedestrian
26 and vehicular movement around the closures, and details of barricades.
- 27 3. Location, type and method of shoring to provide lateral support to the side of an
28 excavation or embankment parallel to an open travel-way.
- 29 4. Allowable on-street parking within the immediate vicinity of worksite.
- 30 5. Access to buildings immediately adjacent to worksite.
- 31 6. Driveways blocked by construction operations.
- 32 7. Temporary traffic control devices, temporary pavement striping and marking of
33 streets and sidewalks affected by construction
- 34 8. Temporary commercial and industrial loading and unloading zones.
- 35 9. Construction vehicle reroutes, travel times, staging locations, and number and size of
36 vehicles involved.

- 1 E. Obtain and submit prior to erection, or otherwise impacting traffic, all required permits
2 from all authorities having jurisdiction, including Orange County Public Works, if
3 applicable.

4 **PART 2 - PRODUCTS**

5 2.01 MATERIALS AND EQUIPMENT

- 6 A. The Contractor will furnish barricades, warning signs, delineators, pilot cars and other
7 traffic control materials and equipment in accordance with the Manual of Uniform Traffic
8 Control Devices for Streets and Highways published by the United States Government
9 Printing Office.

10 2.02 FLAG PERSONS

- 11 A. All flag persons used on this Project will adhere to the following requirements:
12 1. Any person acting as a flag person on this Project will have attended a training
13 session taught by a Contractor's qualified trainer before the start date of this Contract.
14 2. The Contractor's qualified trainer will have completed a "Flag person Train the
15 Trainer Session" in the 5-years previous or before the start date of this Contract and
16 will be on file as a qualified flag person trainer.
17 3. The flag person trainer's name and Qualification Number will be furnished by the
18 Contractor at the Pre-Construction meeting. The Contractor will provide all flag
19 persons with the Flag Person Handbook and will observe the rules and regulations
20 contained therein. This handbook will be in the possession of all flag person while
21 flagging on the Project.
22 4. Flag persons will not be assigned other duties while working as authorized flag
23 persons.
24 5. Any person replacing flag person for break shall have the same training.

25 **PART 3 - EXECUTION**

26 3.01 NOTIFICATIONS

- 27 A. The Contractor will notify individual owners, owner's agents, and tenants of buildings
28 adjacent to worksite in writing, with copies to the county, 72-hours in advance of any
29 disruption to their access to those buildings and/or use of public ways adjacent to the
30 buildings or prohibiting the stopping and parking of vehicles.
- 31 B. Before closing any vehicle or pedestrian thoroughfare, the Contractor will give written
32 notice to the County. Notice will be given no less than 72-hours in advance of the
33 proposed closure, or as may be otherwise provided in the accepted Traffic Control Plan,
34 so that the final approval of such closings can be obtained at least 48-hours in advance.

- 1 C. The Contractor is responsible for notifying Fire and Ambulance Departments whenever
2 roads are impassable.
- 3 D. The Contractor will immediately notify the County of any vehicular or pedestrian safety
4 or efficiency problems incurred as a result of the construction of the Project.

5 3.02 GENERAL TRAFFIC CONTROL

- 6 A. The Contractor will sequence and plan construction operations and will generally conduct
7 Work in such a manner as not to unduly or unnecessarily restrict or impede normal
8 traffic.
- 9 B. Unless otherwise provided, all roads within the limits of the Work will be kept open to all
10 traffic by the Contractor. The Contractor will keep the portion of the project being used
11 by public traffic, whether it is through or local traffic, in such condition that traffic will
12 be adequately accommodated.
- 13 C. The Contractor will be responsible for installation and maintenance of all traffic control
14 devices and requirements for the duration of the construction period. Necessary
15 precautions for traffic control will include, but not be limited to, warning signs, signals,
16 lighting devices, markings, barricades, canalizations and hand signaling devices.
- 17 D. The Contractor will provide and maintain in a safe condition temporary approaches or
18 crossings and intersections with trails, roads, streets, businesses, parking lots, residences,
19 garages and farms.
- 20 E. The Contractor will provide emergency access to all residences and businesses at all
21 times. Residential and business access will be restored and maintained at all times
22 outside of the Contractor's normal working hours.
- 23 F. Traffic is to be maintained on one section of existing pavement, proposed pavement, or a
24 combination thereof. Alternating one-way traffic may be utilized and limited to a
25 maximum length of 500-feet during construction hours. Lane width for alternating one-
26 way traffic will be kept to a minimum width of 10-feet, or as directed by the County.
- 27 G. Travel lanes and pedestrian passways will be drained and kept reasonably smooth, and in
28 a suitable condition at all times in order to provide minimum interference to traffic
29 consistent with the prosecution of the Work.
- 30 H. The Contractor will make provisions at all "open cut" street crossings to allow for free
31 passage of vehicles and pedestrians, either by bridging or other temporary crossing
32 structures. Such structures will be of adequate strength and proper construction and will
33 be maintained by the Contractor in such a manner as not to constitute an undue traffic
34 hazard.

- 1 I. The Contractor will keep all signs in proper position, clean, and legible at all times. Care
2 will be taken so that weeds, shrubbery, construction materials, equipment, and soil are
3 not allowed to obscure any sign, light, or barricade. Signs that do not apply to
4 construction conditions should be removed or adjusted so that the legend is not visible to
5 approaching traffic.
- 6 J. The County may determine the need for, and extent of, additional striping removal and
7 restriping.
- 8 K. Excavated material, spoil banks, construction materials, equipment and supplies will not
9 be located in such a manner as to obstruct traffic, as practicable. The Contractor will
10 immediately remove from the site all demolition material, exercising such precaution as
11 may be directed by the County. All material excavated shall be disposed of so as to
12 minimize traffic and pedestrian inconvenience and to prevent damage to adjacent
13 property.
- 14 L. During any suspension, the Contractor will make passable and open to traffic such
15 portions of the Project and/or temporally roadways as directed by the County for
16 accommodation of traffic during the anticipated period of suspension. Passable
17 conditions will be maintained until issuance of an order for the resumption of
18 construction operations. When Work is resumed, the Contractor will replace or renew
19 any Work or materials lost or damaged because of such temporary use in every respect as
20 though its prosecution had been continuous and without interferences.

21 3.03 TEMPORARY SHORING

- 22 A. Use shoring to maintain traffic when it is necessary to provide lateral support to the side
23 of an excavation or embankment parallel to an open travel-way. Provide shoring when a
24 theoretical 2:1 or steeper slope from the bottom of the excavation or embankment
25 intersects the existing ground line closer than 5-feet (1.5 m) from the edge of pavement of
26 the open travel-way.
- 27 B. The Contractor will furnish, install, and remove sheeting, shoring, and bracing necessary
28 to maintain traffic at locations shown on the Traffic Control Plan and other locations
29 determined during construction.
30

31 END OF SECTION

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SECTION 01590
CONSTRUCTION FIELD OFFICE

PART 1 - GENERAL

1.01 SECTION INCLUDES

- A. Contractor provision of temporary utilities to include electricity, lighting, internet connectivity, heat, ventilation, telephone service, water, and sanitary facilities.
- B. Contractor provision of temporary controls to include barriers, enclosures and fencing, and water control.
- C. Contractor provision of temporary facilities to include access roads, parking, and temporary buildings.
- D. Contractor provision of field offices for the County.
- E. Restrictions on the use of existing adjacent facilities.

1.02 TEMPORARY ELECTRICITY

- A. Provide and pay for power service required for Construction and testing from local utility source.
- B. Provide temporary electric feeder from existing electrical service at location as directed by utility company. Power consumption will not disrupt the County's need for continuous service. Coordinate with the County before making taps or disturbing existing service.
- C. Provide separate metering and pay for cost of energy used until substantial completion. If electric service is turned over to and paid for by the County prior to substantial completion, reimburse the County for energy used up to substantial completion.
- D. Provide power outlets for Construction operations, with branch wiring and distribution boxes located as required. Provide OSHA approved flexible power cords as required.
- E. Contractor-installed permanent convenience receptacles may be used during Construction.

1.03 TEMPORARY LIGHTING

- A. Provide and maintain adequate lighting for Construction operations to achieve a minimum lighting level of one (1) watt/sq ft.
- B. Provide and maintain two (2) foot-candle lighting to exterior staging and storage areas after dark for security purposes.

- 1 C. Provide and maintain 0.25-watt/sq ft H.I.D. lighting to interior Work areas after dark for
2 security purposes.
- 3 D. Provide branch wiring from power source to distribution boxes with lighting conductors,
4 pigtails, and lamps as required.
- 5 E. Maintain lighting and provide routine repairs.
- 6 F. Permanent building lighting may be used during Construction.

7 1.04 TEMPORARY HEAT AND COOLING

- 8 A. Provide and pay for heating and cooling as required to maintain specified conditions for
9 Construction operations or as required for proper conduct of operations included in the Work.
- 10 B. Prior to operation of permanent equipment for temporary purposes, verify that installation is
11 approved for operation, equipment is lubricated and temporary filters are in place. Provide and
12 pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- 13 C. Maintain minimum ambient temperature of 50°F and maximum relative humidity of 50%
14 in areas where Construction is closed in and final finishes are to be placed, unless
15 indicated otherwise in specifications.

16 1.05 TEMPORARY VENTILATION

- 17 A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent
18 accumulation of dust, fumes, vapors, or gases.

19 1.06 TEMPORARY WATER SERVICE

- 20 A. Provide, maintain, and pay for suitable quality water service required for Construction
21 operations. Coordinate with the County if water supply is not separately metered. Pay
22 all costs and expenses associated with such use.
- 23 B. Extend branch piping with outlets located so water is available by hoses with threaded
24 connections.

25 1.07 TEMPORARY SANITARY FACILITIES

- 26 A. Provide and maintain required facilities and enclosures on-site. Maintain daily in clean
27 and sanitary condition. Adjacent County office building toilet facilities are not to be used
28 by Contractor.

29 1.08 BARRIERS

- 30 A. Provide barriers to prevent unauthorized entry to Construction areas and to protect
31 existing facilities and adjacent properties from damage from Construction operations.

- 1 B. Provide barricades required by governing authorities for public rights-of-way.
- 2 C. Provide protection for plant life designated to remain. Replace damaged plant life.
- 3 D. Protect non-owned vehicular traffic, stored materials, site and structures from damage.

4 1.09 FENCING

- 5 A. Unless directed otherwise in other sections of the Contract Documents, provide a 6-foot high
6 fence completely around Construction site; provided with hinged vehicular and pedestrian gates
7 with locks. Fencing will be galvanized, 2-inch mesh, chain link with solid top rail. Provide
8 line posts and end posts as needed to maintain stretched and uniform fencing with no sags.
- 9 B. Fencing plan will be approved by the County for each phase of the project. Submit
10 fencing layout diagram prior to the Pre-Construction meeting.
- 11 C. Provide visual fabric barrier at least 6-foot high on all fencing separating parking areas from
12 Construction activities. Submit barrier fabric for approval before starting fencing. Barrier
13 fabric will be capable of retaining physical integrity and color during the entire Construction
14 period.

15 1.10 ACCESS ROADS

- 16 A. Provide and maintain uninterrupted public access to existing buildings. Construction
17 activities will not interfere with access. If Contractor fails to maintain public access after
18 2 written notices within a 24-hour period, the County reserves the right to correct such
19 situation and back charge the Contractor.
- 20 B. Construct and maintain temporary roads accessing public thoroughfares to serve
21 Construction area.
- 22 C. Extend and relocate access roads as Work progress requires. Provide detours necessary
23 for unimpeded traffic flow.
- 24 D. Provide and maintain access to fire hydrants, free of obstructions.
- 25 E. Designated existing on-site roads may be used for Construction traffic. Repair or restore
26 any damaged areas caused as a result of Construction activity. Such repair will be to a
27 like-new condition.

28 1.11 PARKING

- 29 A. Provide temporary surface parking areas to accommodate Construction personnel.
- 30 B. Do not allow Construction vehicle parking on existing pavement unless approved by County.

1 1.12 FIELD OFFICES (FOR UTILITIES DEPARTMENT)

- 2 A. Promptly after starting Work, the Contractor will provide and maintain 1 field office for
3 the use of the County until Substantial Completion.
- 4 B. The field offices will be an appropriate size required for the use of the County, as well as
5 contain two offices and three desks. The field office structure will be a minimum of 10-
6 feet x 40-feet. The layout of the County's field office will include adequate space to hold
7 project meetings (minimum seating for 15).
- 8 C. Installation of the field offices will meet all local codes and ordinances. The Contractor
9 will as a minimum install the structures on a level, well-drained area. Structures will be
10 designed and installed to resist 130-mph winds or applicable State of Florida code,
11 whichever is more stringent.
- 12 D. The field offices will be provided with structurally sound and safe steps and landings for
13 each door. The doors will have secure locks. Construct appropriate walkway and
14 landings. Construct covers over each door that extends 3-feet from the building and the
15 full width of the landing.
- 16 E. The field offices will be designated as a "No Smoking Area."
- 17 F. The windows will be arranged for cross ventilation with screens.
- 18 G. Provide air conditioning and heating systems with thermostat control.
- 19 H. Provide electric power for the duration of the Work.
- 20 I. The Contractor will provide the following with the field office, at a minimum:
21 1. Electric lights (fifty (50) foot-candles at desktop height) and power supply outlets.
22 2. When available, provide high-speed Internet access to all desks for the duration of the
23 Work.
24 3. Acceptable toilet facilities with appropriate signage that meet all of the local and
25 State health codes and regulations.
26 4. Fire extinguisher (Halon type, minimum 4 lb. capacity).
27 5. Water coolers, bottled water and paper cups.
28 6. Tables for viewing the Project Drawings.
29 7. Standard office supplies.
30 8. Weekly janitorial services.

31 1.13 SPECIFIC REQUIREMENTS FOR THE FIELD OFFICES

- 32 Provide the following for the exclusive use of the County: (Unless otherwise noted, the quantity
33 should be sufficient for the duration of the Work.)
- 34 A. Office Furnishings: The furniture will be delivered and placed as directed by the County.
- 35 B. Desks: Flat top, double pedestal, with one box and one file drawer in each pedestal, 60-inches
36 by 30-inches. Total quantity will be three (3).

- 1 C. Chairs: Three (3) office-type chairs, adjustable heights, on rollers, with armrests.
- 2 D. Conference Table and Chairs: One (1) table (3-feet by 8-feet minimum), scratch and stain
3 resistant and 15 meeting-type chairs.
- 4 E. Drawing Table: Two (2) plywood or standard drawing tables, 3-feet by 6-feet, with all required
5 appurtenances and 2 extended height stools suitable for use at the drawing tables.
- 6 F. Printer: One(1) - All in one color inkjet printer capable of printing, scanning and coping
7 Ledger, Legal and Letter sizes. Standard interfaces shall include Hi-Speed USB 2.0,
8 Wireless (802.11b/g/n), Ethernet. Minimum requirements include: 35 page automatic
9 document feeder, printing 20 color copies per minute at 6000 x 1200 dpi resolution, scan
10 resolution 2400 x 2400 dpi, flat bed document glass size Ledger (11" x 17") with standalone
11 copy features, minimum of 250 sheet input capacity cassettes and 2 additional complete set
12 of ink cartridges. Brother MFC-J6710DW or equal. Printers to be retained by the County..
13 All warranties, maintenance, servicing and sufficient appropriate ink/toner cartridges and
14 paper for the duration of the Work.
- 15 G. One (1) each refrigerator, microwave, coffee machine, and toaster oven.
- 16 1. Provide Internet connection in each of the four offices in the field trailer. The
17 connection shall be at least 5.0 Mbps of download speed or greater. Provide office
18 with a wireless network 802.11 n with minimum of 8 concurrent users in addition to
19 the network requirements. Wireless network shall allow additional portable
20 computers to gain internet access within the office.
- 21 H. File Cabinets, Storage, Bookcases:
- 22 1. Three (3) Lateral Files: HON 600 Series, or equal, 42-inch wide, four-drawer.
- 23 2. Two (2) steel vertical, hanging mobile plan stands, with approximately 12-hanging
24 clamps. Provide all required clamps, of sufficient length to hold the Contract Drawings.
- 25 3. Storage: Two (2) industrial grade steel cabinets, locking handles, 36-inches wide by 18-
26 inches deep by 72-inches high.
- 27 4. Bookcases: Three (3) HON metal bookcases, or equal, 34-1/2-inches wide by 12-5/8-
28 inches deep by 71-inches high, color to be selected by the Engineer.
- 29 I. Miscellaneous Field Supplies:
- 30 1. One (1) minimum/maximum digital thermometer, with batteries for the duration of the
31 Work.
- 32 2. One (1) rain gauge.
- 33 1.14 REMOVAL OF TEMPORARY UTILITIES, FACILITIES, AND CONTROLS
- 34 A. Remove all temporary utilities, equipment, facilities, and materials prior to submitting Final
35 Application for Payment.
- 36 B. Remove temporary underground installations to minimum depth of 2-feet and re-grade site.
- 37 C. Clean and repair damage caused by installation or use of temporary Work.

1 D. Restore any existing facilities used during Construction to original condition, unless
2 otherwise directed in other sections of Contract Documents. Restore existing landscaping,
3 drainage, paving, etc. to an "as-was" condition, unless otherwise directed in other sections of
4 Contract Documents.

5 **PART 2 - PRODUCTS (NOT USED)**

6 **PART 3 - EXECUTION (NOT USED)**

7 **END OF SECTION**

SECTION 01610
DELIVERY, STORAGE AND HANDLING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This Section specifies the general requirements for the delivery, handling, storage and protection for all items required in the construction of the Work.
- B. Deliver, handle and store products in accordance with manufacturer's recommendations and by methods and means that will prevent damage, deterioration, and loss including theft and protect against damage from climatic conditions. Control delivery schedules to minimize long-term storage of products at the site and overcrowding of construction spaces. In particular, provide delivery/installation coordination to ensure minimum holding or storage times for products recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other sources of loss. Damaged or defective items, in the opinion of the Owner, will be replaced at no cost to the Owner.

1.02 REQUIREMENTS

- A. The Contractor is 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.
- B. All materials and equipment to be incorporated in the Work will be handled and stored by the Contractor before, during and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.
- C. All materials and equipment, which in the opinion of the Owner, have become so damaged as to be unfit for the use intended or specified, will be promptly removed from the site of the Work, and the Contractor will receive no compensation for the damaged materials or equipment or for its removal.
- D. In the event any such material, equipment and supplies are lost, stolen, damaged or destroyed prior to final inspection and acceptance, the Contractor will replace same without additional cost to the Owner.

1.03 DELIVERY

- A. Transport and handle items in accordance with manufacturer's instructions.
- B. The Owner and the Contractor's project superintendent must be on-site to accept all deliveries shipped directly to the job site. If the project superintendent is not present for a delivery, that delivery may be rejected by the Owner. If any delivery is rejected

due to non-availability of the Contractor's project superintendent, delivery shall be rescheduled at no additional cost to the Owner.

- C. Schedule delivery to reduce long-term on-site storage prior to installation and/or operation. Under no circumstances will materials or equipment be delivered to the site more than 1-month prior to installation without written authorization from the Owner.
- D. Coordinate deliveries in order to avoid delay in, or impediment of, the progress of the Work.
- E. Schedule deliveries to the site not more than 1-month prior to scheduled installation without written authorization from the Owner.
- F. Coordinate delivery with installation to ensure minimum holding time for items that are hazardous, flammable, easily damaged or sensitive to deterioration.
- G. All items delivered to the site will be unloaded and placed in a manner that will not hamper the Contractor's normal construction operation or those of Subcontractors and other Contractors and will not interfere with the flow of necessary traffic.
- H. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible. Maintain packaged materials with seals unbroken and labels intact until time of use.
- I. Immediately on delivery, inspect shipments with the Owner to ensure compliance with requirements of Contract Documents and accepted submittals, and that products are properly protected and undamaged. If the Contractor does not notify the Owner regarding the delivery and the Owner rejects any part of the delivery, there will be no additional cost to the Owner for the material to be returned. For items furnished by others (i.e. Owner), perform inspection in the presence of the Owner. Provide written notification to the Owner of any problems.
- J. Promptly remove damaged material and unsuitable items from the job site, and promptly replace with material meeting the specified requirements, at no additional cost to the Owner.

1.04 STORAGE AND HANDLING

- A. Provide equipment and personnel to handle products by methods recommended by the manufacturer to prevent soiling or damage to products or packaging, with seals and labels intact and legible.
- B. The Contractor is responsible for securing a location for on-site storage of all material and equipment necessary for completion of the Work. The location and storage layout will be submitted to the Owner at the Pre-Construction conference.
- C. Manufacturer's storage instructions will be carefully studied by the Contractor and reviewed with the Owner. These instructions will be carefully followed and a written record of this kept by the Contractor.

- D. All material delivered to the job site will be protected 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.
- E. When required or recommended by the manufacturer, the Contractor will 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.
- F. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored products to assure that products are maintained under specified conditions and free from damage or deterioration.
- G. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within 7-days after written notice to do so has been given, 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 Contract Amount. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and any other costs associated with making the necessary corrections.

1.05 SPECIFIC STORAGE AND HANDLING

(Additional specific storage and handling requirements may be found in the specification sections addressing the material requirements.)

- A. All mechanical and electrical equipment and instruments subject to corrosive damage by the atmosphere if stored outdoors (even though covered by canvas) will be stored in a weather tight building to prevent damage. The building may be a temporary structure on the site or elsewhere, but it must be satisfactory to the Owner. The building will be provided with adequate ventilation to prevent condensation. Maintain temperature and humidity within range required by manufacturer.
 - 1. All equipment will be stored fully lubricated with oil, grease and other lubricants unless otherwise instructed by the manufacturer. Mechanical equipment to be used in the Work, if stored for longer than 90-days, will have the bearings cleaned, flushed and lubricated prior to testing and startup, at no extra cost to the Owner.
 - 2. Moving parts will be rotated a minimum of once weekly to ensure proper lubrication and to avoid metal-to-metal "welding." Upon installation of the equipment, the Contractor will start the equipment, at least half load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.
 - 3. Lubricants will be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. New lubricants will be put into the equipment at the time of acceptance. Prior

to acceptance of the equipment, the Contractor will have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer will be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment will be judged to be defective. It will be removed and replaced at the Contractor's expense.

4. Electric motors provided with heaters will be temporarily wired for continuous heating during storage. Upon installation of the equipment, the Contractor will start the equipment, at least half load, and once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.
- B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- C. Cement and lime will be stored under a roof and off the ground and will be kept completely dry at all times.
- D. Brick, block and similar masonry products will be handled and stored in a manner to minimize breakage, chipping, cracking and spilling to a minimum.
- E. Precast Concrete will be handled and stored in a manner to prevent accumulations of dirt, standing water, staining, chipping or cracking.
- F. All structural and miscellaneous steel and reinforcing steel will be stored off the ground or otherwise to prevent accumulations of dirt or grease, and in a position to prevent accumulations of standing water and to minimize rusting. Beams will be stored with the webs vertical.
- G. Metals will be stored dry, all under cover and vented to prevent build-up of humidity, all off ground to provide air circulation.
- H. Lumber will be stacked to provide air circulation. Store materials for which maximum moisture content is specified in an area where moisture content can be maintained.
- I. Gypsum wallboard systems will be stored to protect all metal studs, furring, insulation boards, batts, accessories and gypsum board to prevent any type of damage to these materials. Rusted material components, damp or wet insulation or gypsum boards will not be accepted.
- J. Acoustical materials will be delivered to the job site in unbroken containers labeled and clearly marked. Materials will not be removed from containers until ready to install, but will be stored in dry area with cartons neatly stacked. Before installation, acoustical board will be stored for not less than 24-hours in the Work area at the same temperature and relative humidity.

- K. Linear items will be stored in dry area with spacers to provide ventilation. Stack linear items to prevent warping, complying with manufacturer's instructions.
- L. Paints and other volatile materials will be stored within approved safety containers. No glass jugs will be permitted. Storage areas will be equipped with not less than 2 fire extinguishers (C02 type) sufficient to discharge a distance of 25-feet when fully charged and have current tags. No other building materials will be stored in this area. Used rags will be removed daily. Clean rags will be stored in metal closed containers.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01700
PROJECT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

The term "Project Closeout" is defined to include requirements near the end of the Contract Time, in preparation for Substantial Completion acceptance, occupancy by the County, release of retainage, final acceptance, final payment, and similar actions evidencing completion of the Work. Time of closeout is directly related to "Substantial Completion"; therefore, the time of closeout may be either a single period for the entire Work or a series of time periods for individual elements of Work that has been certified as substantially complete at different dates. This time variation, if any, will be applicable to the other provisions of this section.

1.02 SCOPE OF WORK

- A. This Section specifies administrative and procedural requirements for project closeout, including but not limited to:
1. Final Cleaning
 2. Substantial Completion
 3. Final Acceptance

1.03 RELATED WORK

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Closeout requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.
- C. Section 01720 "Project Record Documents"
- D. Section 01740 "Warranties and Bonds"

1.04 PREREQUISITES FOR SUBSTANTIAL COMPLETION.

When the Contractor considers the Work as substantially complete, submit to the County a written notice stating so and requesting an inspection to determine the status of completion. The Contractor will attach to the notice a list of items known to be incomplete or yet to be corrected. Complete the following before requesting the County's inspection for certification of substantial completion.

- 1 A. In the progress payment request that coincides with or is the first request following, the date
2 substantial completion is claimed, show 100% completion or list incomplete items, the value
3 of incomplete Work, and reasons for the Work being incomplete. Inspection procedures
4 include supporting documentation for completion as indicated in these Contract Documents.
- 5 B. Submit a statement showing an accounting of changes to the Contract Sum.
- 6 C. Submit specific warranties, workmanship/maintenance bonds, maintenance agreements,
7 final certifications and similar documents in accordance with Section 01740 "Warranties
8 and Bonds."
- 9 D. Obtain and submit lien releases enabling the County's full, unrestricted use of the Work
10 and access to services and utilities.
- 11 E. Consult with County before submitting Record Documents in accordance with Section
12 01720 "Project Record Documents."
- 13 F. Submit Operation and Maintenance Manuals.
- 14 G. Make final changeover of permanent locks. Submit keys and keying schedule.
- 15 H. Deliver tools, spare parts, extra stock, and similar items.
- 16 I. Complete final cleaning requirements necessary for Substantial Completion.

17 1.05 FINAL CLEANING.

18 Complete the following cleaning operations prior to Substantial Completion or Owner occupancy.

- 19 A. Remove from job site all tools, surplus materials, construction equipment, storage sheds,
20 debris, waste and temporary services.
- 21 B. Clean the site, including landscape development areas, of rubbish, litter and other foreign
22 substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits.
23 Rake grounds that are neither paved nor planted, to a smooth even-textured surface.
- 24 C. Structures:
 - 25 1. Visually inspect exterior surfaces and remove all traces of soil, waste materials,
26 smudges and other foreign matter.
 - 27 2. Remove all traces of splashed materials from adjacent surfaces.
 - 28 3. Ensure exterior surfaces have a uniform degree of cleanliness.
 - 29 4. Visually inspect interior surfaces and remove all traces of soil, waste materials,
30 smudges and other foreign matter.
 - 31 5. Remove paint droppings, spots, stains and dirt from finished surfaces.
 - 32 6. Remove labels that are not permanent labels.
 - 33 7. Clean transparent materials, including mirrors and glass in doors and windows.
34 Remove glazing compound and other substances that are noticeable vision-obscuring
35 materials. Replace chipped or broken glass and other damaged transparent materials.

- 1 8. Clean exposed exterior and interior hard-surfaced finishes to a dust-free condition,
2 free of stains, films and similar foreign substances. Leave concrete floors broom
3 clean.
- 4 9. Wipe surface of mechanical and electrical equipment. Remove excess lubrication and
5 other substances. Clean light fixtures and lamps.
- 6 10. Clean permanent filters of ventilating systems and replace disposable filters if units
7 were operated during construction. Clean ducts, blowers and coils if units were
8 operated without filters during construction.

9 1.06 OPERATION AND MAINTENANCE MANUALS

- 10 A. The Contractor will submit the proposed format, content and tab structure for all
11 Operating and Maintenance Manuals for the County's review and approval. The tab
12 structure for Operating and Maintenance Manuals will follow specification division
13 format as accepted by the Construction Specification Institute. After the County
14 approves the proposed format, content, and tab structure for the Operating and
15 Maintenance Manuals, the Contractor will create and deliver 5 complete sets.
- 16 B. Operation and Maintenance documentation is required for each piece of mechanical,
17 electrical, communications, instrumentation and controls, pneumatic, hydraulic,
18 conveyance, and special construction. If required by the technical specifications, provide
19 Operation and Maintenance documentation for any other product not listed in the
20 foregoing.
- 21 C. The requirements of this Section are separate, distinct and in addition to product
22 submittal requirements that may be established by other Sections of the Specifications.
23 Owner's manuals, manufacturer's printed instructions, parts lists, test data and other
24 submittals required by other Sections of the Specifications may be included in the
25 Operating and Maintenance Manuals provided that they are approved and are formatted
26 in a manner consistent with the requirements of this Section.
- 27 D. Deliver Operation and Maintenance Manuals directly to the County.
- 28 E. Operating and Maintenance Manual documents must include, but are not limited to, table
29 of contents, approved submittals, manufacturer's operating and maintenance instructions,
30 brochures, Shop Drawings, performance curves and data sheets annotated to indicate
31 equipment actually furnished (e.g. identifying impeller size, model, horsepower, etc),
32 procedures, wiring and control diagrams, records of factory and field tests and
33 device/controller settings and calibration, program lists or data compact discs,
34 maintenance and warranty terms and contact information, spare parts listings, inspection
35 procedures, emergency instructions, and other Operating and Maintenance documentation
36 that may be useful to the County. The material and equipment data required by this
37 Section must include all data necessary for the proper installation, removal, normal
38 operation, emergency operation, startup, shutdown, maintenance, cleaning, adjustment,
39 calibration, lubrication, assembly, disassembly, repair, inspection, trouble-shooting, and
40 warranty service of the equipment or materials.

- 1 F. The Contractor must bind the Operating and Maintenance Manual documents in heavy-
2 duty, 3-ring vinyl-covered binders including pocket folders for folded sheet information.
3 Mark binder identification on both the front and spine of each binder. Binder information
4 must list the project title, identify separate structures or locations as applicable, identify
5 the general subject matter covered in the manual and must include the words
6 "OPERATING AND MAINTENANCE INSTRUCTIONS".
- 7 1. The Contractor must submit the Operating and Maintenance documents on three-hole
8 punched, 8-1/2-inch x 11-inch sheets or on three-hole punched sheets that are
9 foldable in multiples of 8-1/2-inch x 11-inch. The three-hole punched edge will be
10 the left 11-inch edge.
- 11 2. The Contractor may request waivers to the size requirement for specific instances.
12 The Contractor's waiver request must be in writing to the County. The Contractor's
13 waiver request must include a justification for seeking the waiver.
- 14 G. The Contractor must provide an electronic version of the complete and final Operating
15 and Maintenance Manuals in original electronic file format on compact disc or DVD.
16 The Contractor must also provide one (1) electronic pdf file of each bound Operating and
17 Maintenance Manual that represents each Manual's content. The electronic pdf file must
18 match the Operating and Maintenance Manual content and organizational structure.

19 1.07 SUBSTANTIAL COMPLETION INSPECTION PROCEDURES

- 20 A. Upon receipt of the Contractor's request for inspection, the County will either proceed
21 with inspection or advise the Contractor of incomplete prerequisites.
- 22 B. Following the initial inspection, the County will either prepare the certificate of
23 Substantial Completion, or advise the Contractor of Work which must be performed
24 before the certificate will be issued. The County will repeat the inspection when
25 requested in writing and when assured that the Work has been substantially completed.
- 26 C. Results of the completed inspection will form the initial "punch list" for final acceptance.

27 1.08 PREREQUISITES FOR FINAL ACCEPTANCE.

28 Complete the following before requesting the County's final inspection for certification of
29 final acceptance, and final payment. List known exceptions, if any, in the request.

- 30 A. Submit the final payment request with final releases and supporting documentation not
31 previously submitted and accepted. Include certificates for insurance for products and
32 completed operations where required.
- 33 B. Submit written certification that:
- 34 1. The County's final punch list of itemized Work to be completed or corrected, stating
35 that each item has been completed or otherwise resolved for acceptance.
- 36 2. The Contract Documents have been reviewed and Work has been completed in
37 accordance with Contract Documents.

- 1 3. Equipment and systems have been tested in the presence of the County and are
2 operational.
3 4. Work is completed and ready for final inspection.
- 4 C. Submit consent of surety.
- 5 D. Submit evidence of final, continuing insurance coverage complying with insurance
6 requirements.

7 1.09 **FINAL ACCEPTANCE INSPECTION PROCEDURES**

- 8 A. The County will re-inspect the Work upon receipt of the Contractor's written notice that
9 the Work, including punch list items resulting from earlier inspections, has been
10 completed, except for those items for which completion has been delayed because of
11 circumstances that are acceptable to the County.
- 12 B. Upon completion of re-inspection, the County will either prepare a certificate of final
13 acceptance or advise the Contractor of Work that is incomplete or of obligations that have
14 not been fulfilled, which are required for final acceptance.
- 15 C. If necessary, the re-inspection procedure will be repeated.

16 **PART 2 - PRODUCTS (NOT USED)**

17 **PART 3 - EXECUTION (NOT USED)**

18

19

END OF SECTION

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1 **SECTION 01720**

2 **PROJECT RECORD DOCUMENTS**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. The purpose of the Project Record Documents is to provide the County with factual
6 information regarding all aspects of the Work, both concealed and visible.

7 B. To insure the Work was constructed in conformance with the Contract Drawings, the
8 following survey documents are required to be prepared and certified by a Surveyor as
9 per Spec Section 01050 Surveying and Field Engineering:

- 10 1. Asset Attribute Data Form
11 2. Pipe Deflection Table
12 3. Gravity Main Data
13 4. Boundary Survey and Survey Map Report for pump stations and easements with
14 constructed improvements
15

16 The Asset Attribute Data and Pipe Deflection Table forms can be found on the County's
17 web site:

18 [http://www.orangecountyfl.net/WaterGarbageRecycling/UtilitiesCapitalImprovementPro
19 gram.aspx](http://www.orangecountyfl.net/WaterGarbageRecycling/UtilitiesCapitalImprovementProgram.aspx)

20 1.02 DEFINITIONS

21 A. As-Built Drawings: Drawings prepared by the Contractor's Surveyor depicting the actual
22 location of installed utilities for the completed Work.

23 B. Record Documents: All documents in subsections 1.04 and 2.02 in this specification.

24 C. Boundary Survey: Boundary survey, map and report certified by a Surveyor shall be provided
25 that meets the requirements of Chapter 5J-17 'Minimum Technical Standards', FAC.

26 D. Surveyor: Contractor's Surveyor that is licensed by the State of Florida as a Professional
27 Surveyor and Mapper pursuant to Chapter 472, F.S.

28 E. Survey Map Report: As a minimum the Survey Map Report shall identify any corners
29 that had to be reset, measurements and computations made, pump station and easement
30 boundary issues, locations of constructed improvements outside boundaries, and
31 accuracies obtained.

32 1.03 QUALITY ASSURANCE

33 A. Delegate the responsibility for maintenance of the Record Documents to one person on

- 1 the Contractor's staff as approved by the County.
- 2 B. Thoroughly coordinate changes within the Record Documents, making adequate and
3 proper entries on each page of specifications and each sheet of Drawings and other
4 documents where such entry is required to show progress and changes properly.
- 5 C. Make entries within 24-hours after receipt of information has occurred.

6 **1.04 RECORD DOCUMENTS AT SITE**

- 7 A. Maintain at the site and always available for County's use one (1) record copy of:
8 1. Construction Contract, Drawings, Specifications, General Conditions, Supplemental
9 Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all other Contract
10 Documents
11 2. Change Orders, Verbal Orders, and other modifications to Contract
12 3. Written instructions by the County as well as correspondence related to Requests for
13 Information (RFIs)
14 4. Accepted Shop Drawings, Samples, product data, substitution and "or-equal" requests
15 5. Field test records, inspection certificates, manufacturer certificates and construction
16 photographs
17 6. Paper copies of the Progressive As-Built Drawings
18 7. Current Surveyor's tables for the Assets Attribute Data, Pipe Deflection Data, and
19 Gravity Main Data
- 20 B. Maintain the documents in an organized, clean, dry, legible condition and protected from
21 deterioration, loss and damage until completion of the Work, transfer of all record data to
22 the final As-built Drawings for submittal to the County.
- 23 C. Store As-Built Documents and samples in Contractor's office apart from documents used
24 for construction. Do not use As-Built document for construction purposes. Label each
25 document "AS-BUILT" in neat large printed letters. File documents and samples in
26 accordance with CSI/CSC format.
- 27 D. Record information concurrently with construction progress. Do not conceal any Work
28 until required information is recorded.

29 **PART 2 - PRODUCTS**

30 **2.01 AS-BUILT DRAWINGS**

- 31 A. Maintain the electronic As-Built Drawings to accurately record progress of Work and
32 change orders throughout the duration of the Contract.
- 33 B. Date all entries. Enter RFI No., Change Order No., etc. when applicable.
- 34 C. Call attention to the entry by highlighting with a "cloud" drawn around the area affected
35 or other means. In the event of overlapping changes, use different colors for entries of

- 1 the overlapping changes.
- 2 D. Design call-outs shall have a thin strike line through the design call-out and all As-Built
3 information must be labeled (or abbreviated "AB") and be shown in a bolder text that is
4 completely legible.
- 5 E. Make entries in the pertinent other documents while coordinating with the County for
6 validity.
- 7 F. Entries shall consist of graphical representations, plan view and profiles, written
8 comments, dimensions, State Plane Coordinates, details and any other information as
9 required to document field and other changes of the actual Work completed. As a
10 minimum, make entries to also record:
- 11 1. Depths of various elements of foundation in relation to finish floor datum and State
12 Plane Coordinates and elevations.
 - 13 2. Asset Attribute Data Form shall be completed in the Drawings.
 - 14 3. When electrical boxes, or underground conduits and plumbing are involved as part of
15 the Work, record true elevations and locations, dimensions between boxes.
 - 16 4. Actually installed pipe or other work materials, class, pressure-rating, diameter, size,
17 specifications, etc. Similar information for other encountered underground utilities,
18 not installed by Contractor, their owner and actual location if different than shown in
19 the Contract Documents.
 - 20 5. Details, not on original Contract Drawings, as needed to show the actual location of
21 the Work completed in a manner that allows the County to find it in the future.
 - 22 6. The Contractor shall mark all arrangements of conduits, circuits, piping, ducts and
23 similar items shown schematically on the construction documents and show on the
24 As-Built Drawings the actual horizontal and vertical alignments and locations.
 - 25 7. Major architectural and structural changes including relocation of doors, windows,
26 etc. Architectural schedule changes according to Contractor's records and Shop
27 Drawings.

28 2.02 RECORD DOCUMENTS

- 29 A. Three (3) paper copy sets and three (3) digital media sets of the following final Record
30 Documents below.
- 31 B. The following documents shall be signed and sealed by the Surveyor:
- 32 1. Asset Attribute Data Form (see Specification Section 01050 "Surveying and Field
33 Engineering," Table 01050-2 for an example)
 - 34 2. Boundary Survey of fee simple sites (pump station, etc.) and permanent easements
35 with the respective Survey Map Reports
 - 36 3. Boundary Survey and Survey Map Report for the location of constructed pipes within
37 any easements and right-of-way. As a minimum the Survey Map Report shall
38 identify or describe the locations where the pipe centerline was constructed within 3-
39 feet of the easement or right-of-way boundary, where the pipe was constructed
40 outside the easement or right-of-way boundary, any corners that had to be reset,
41 measurements and computations made, pump station boundary issues, and accuracies

- 1 obtained. Survey map report shall be dated after the Work within the right-of-ways
2 or easements have been completed.
- 3 4. Gravity Main Table (see Specification Section 01050 "Surveying and Field
4 Engineering", Table 01050-4 for an example)
- 5 5. Pipe Deflection Table (see Specification Section 01050 "Surveying and Field
6 Engineering" Table 01050-3 for an example). An electronic blank table will be
7 supplied by the County.
- 8 C. Digital sets of the final Record Documents including but not limited to:
- 9 1. Scanned digital copies of the final As-Built Drawings
- 10 2. Electronic Survey documents electronically sealed by the Surveyor
- 11 3. Final Record Documents
- 12 4. Digital file of As-Built Drawing in the Engineer's current version of AutoCAD file
13 (dwg) format
- 14 D. Pump station site Boundary Survey and Map Report.
- 15 E. New Boundary Survey to re-establish easement corners, right-of-way monuments, or
16 pump station site corners with monuments if destroyed by the Work.
- 17 F. Scanned Documents: Scan Record Documents reflecting changes from the Contract
18 Documents.
- 19 G. The scanned "As-Built" Drawing sets shall be complete and include the title sheet,
20 plan/profile sheets, cross-sections, and details. Each individual sheet contained in the
21 printed set of the As-Built Drawings shall be included in the electronic drawings, with
22 each sheet being converted into an individual tif (tagged image file). The plan sheets
23 shall be scanned in tif format Group 4 at minimum of 400 dpi resolution to maintain
24 legibility of each drawing. Then, the tif images shall be embedded into a single pdf
25 (Adobe Acrobat) file representing the complete plan set. Review all Record Documents
26 to ensure a complete record of the Project.
- 27 H. Provide an encompassing digital AutoCAD file that includes all the information of the
28 As-Built Drawings and any other graphical information in the As-Built Drawings. It
29 shall include the overall Work, utility system layout and associated parcel boundaries and
30 easements. Feature point, line and polygon information for new or altered Work and all
31 accompanying geodetic control and survey data shall be included. The surveyor's
32 certified As-Built Asset Attribute Data shall be added to the As-Built Drawings and
33 Surveyor shall electronically seal the data in a comma-delineated ASCII format (txt).

34 **PART 3 - EXECUTION**

35 3.01 PRE-CONSTRUCTION MEETING

- 36 A. Pre-construction Meeting: It is recommended that the Surveyor attend the Pre-
37 construction meeting. At the pre-construction meeting the Contractor shall be provided
38 with a blank electronic version of the spreadsheet for the tables: Asset Attribute Data and

1 Pipe Deflection. The Contractor's surveyor shall use these tables to input the data and
2 shall not alter the table format or formulas.

3 3.02 CONSTRUCTION PROGRESS MEETINGS

4 A. Contractor shall provide progressive Record Documents described below:

- 5 1. Construction Contract, As-Built Drawings, Specifications, General Conditions,
6 Supplemental Conditions, Bid Proposal, Instruction to Bidders, Addenda, and all
7 other Contract Documents.
- 8 2. Specifications and Addenda: Record manufacturer, trade name, catalog number and
9 supplier of each product and item of equipment actually installed as well as any
10 changes made by Field Order, Change Order or other.
- 11 3. Change orders, verbal orders, and other modifications to Contract.
- 12 4. Written instructions by the County as well as correspondence related to Requests for
13 Information (RFIs).
- 14 5. Accepted Shop Drawings, samples, product data, substitution and "or-equal" requests.
- 15 6. Field test records, inspection certificates, manufacturer certificates and construction
16 photographs.
- 17 7. As-Built Asset Attribute Data Form: Surveyor shall obtain field measurements of
18 vertical and horizontal dimensions of constructed improvements. The monthly
19 submittal shall include the Surveyor's certified statement regarding the constructed
20 improvements being within the specified accuracies as described in Specification
21 Section 01050 "Surveying and Field Engineering", Table 01050-1 Minimum Survey
22 Accuracies or if not, indicating the variances.
- 23 8. Gravity Main Table: Surveyor shall prepare and update a Gravity Main Table to
24 include as a minimum the pipe segment identification, pipe lengths, manhole inverts
25 and tops, and slopes for gravity mains. Surveyor shall certify the data entered are
26 correct and indicate if the minimum slopes have not been met.
- 27 9. Pipe Deflection Table: Surveyor shall input the type of pipe, pipe manufacturer, PVC
28 manufacturer deflection allowance, allowable angle of offset and radius of curvature,
29 laying length of pipe, and coordinates. Surveyor shall certify the data entered are
30 correct and indicate if the deflection allowance, offset or radius of curvature exceeds
31 the manufacturer's recommendations.

32 3.03 FINAL RECORD DOCUMENTS SUBMITTAL

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

- 34 1. Participate in review meetings as required and make required changes and promptly
35 deliver the Final Record Documents to the County.

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37 **END OF SECTION**

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SECTION 02080
ABANDONMENT, REMOVAL AND SALVAGE OR DISPOSAL
OF EXISTING PIPE REMOVED FROM SERVICE

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Furnish all labor, materials, equipment and incidentals required to abandon, remove, salvage and/or dispose of existing pipelines as shown on the Drawings and as specified herein.

1.02 QUALITY ASSURANCE

- A. Permits and Licenses: Contractor shall obtain and pay respective fees for all necessary permits and licenses for performing the Work and shall furnish a copy of same to the Engineer prior to commencing the Work. The Contractor shall comply with the requirements of the permits.
- 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 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 abandoned as designated in the Drawings and as specified herein.

1.03 SUBMITTALS

- A. Shop Drawings
 - 1. Shop drawings shall be submitted to the Engineer for review and acceptance prior to construction in accordance with Division 1 for the following:
 - a. Grout

PART 2 - MATERIALS (NOT USED)

PART 3 - EXECUTION

3.01 REMOVAL, ABANDONMENT AND DISPOSAL

- A. General: Existing piping designated on the Drawings to be removed shall be exposed and removed by the Contractor in accordance with the requirements specified herein.
- B. Types of facilities to be removed:
 - 1. Ductile Iron Water Main

2. PVC Water Main
- C. Removal and Disposal:
1. Pipe designated to be removed and disposed by the Contractor shall be completely drained and the contents properly disposed. The piping system shall then be completely removed from the site, including fittings, valves and other in-line devices.
- D. Removal of material to be salvaged:
1. Pipes, valves and any other material designated on the Drawings to be removed and salvaged shall be completely drained and the contents properly disposed. The pipe shall then be thoroughly pressure washed, palletized on wooden skids to a dimension not exceeding the recommendation of the manufacturer, and conveyed to the County at the location designated by the County.
- E. Abandonment:
1. Pipe, valves and any other material designated on the Drawings to be abandoned (or retired in place) shall be left in place, drained and its contents properly disposed. Segments requiring removal shall be done so in accordance with Article 3.01C above. All other pipe requires only end caps or plugs, unless otherwise specified on the Drawings.
 2. Grout: Where designated on the Drawings, pipe to be abandoned shall be filled with grout in accordance with Section 03600, "Grouting".

END OF SECTION

SECTION 02100
EROSION AND SEDIMENTATION CONTROL

PART 1 - GENERAL

1.01 WORK INCLUDED

- A. The Work specified in this Section consists of designing, providing, maintaining and removing temporary erosion, sedimentation and turbidity controls as necessary to protect the Work and prevent sedimentation from the Contractor's activities from entering water bodies or entering other parts of the Owner's or other property owners' sites outside the construction limits.
- B. Temporary erosion controls include, but are not limited to, sodding on-site surfaces and soil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by federal, state and local requirements and by the Owner.
- C. Temporary sedimentation controls include, but are not limited to; silt fence, silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which will ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by federal, state and local requirements and by the Owner.
- D. Temporary turbidity controls include, but are not limited to, floating or staked turbidity barriers which will ensure that turbidity pollution will be either eliminated or maintained within acceptable limits as established by Federal, state, and local requirements and by the Owner.

1.02 REQUIREMENTS

- A. The Contractor is responsible for providing effective temporary erosion and sediment control measures during Construction or until final controls become effective.
- B. The Contractor shall be responsible for filing Notice of Intent for Construction Activities with regulatory agencies (SFWMD, FDEP, etc.) as required by law, if thresholds are expected to be exceeded.
- C. The areas of unstabilized soil cover shall be minimized at all times to limit erosion and sedimentation.

1.03 SUBMITTALS:

- A. The Contractor shall prepare and submit an Erosion and Sedimentation Control Plan (Stormwater Pollution Prevention Plan) for Owner review and approval, and shall be responsible for submitting the SPPP and maintaining compliance. The Plan shall be in effect throughout the Construction duration.

PART 2 - PRODUCTS

2.01 EROSION CONTROL

- A. Sod: Provide sod in all other areas. Sod is specified in Section 02578.
- B. Netting: Polypropylene mesh netting 5/8-inch x 3/4-inch (16 x 19mm) mesh with interwoven curlex fibers as manufactured by American Excelsior Company or equal. Netting: Fabricated of material in conformance with Section 985, FDOT Standard Specification for Road & Bridge Construction. Netting Fence shall be fabricated of material acceptable to the Owner.

2.02 SEDIMENTATION CONTROL

- A. Bales: Clean, seed-free cereal hay type. Minimum dimensions of 14-inch by 18-inch by 36-inches at the time of placement.
- B. Netting: Fabricated of material in conformance with Section 985, FDOT Standard Specification for Road & Bridge Construction.
- C. Sediment Control Fencing (Silt Fencing): As manufactured by American Excelsior Company or equal.
- D. Filter stone: Crushed stone conforming to Florida Department of Transportation Specifications.
- E. Concrete block: Hollow, non-load bearing type.
- F. Concrete: Exterior grade not less than 1-inch thick.
- G. Rock Bags: conforming to FDOT Specifications.

2.03 TURBIDITY CONTROL

- A. Conforming to FDOT Design Standards Index 103 - Turbidity Barriers.
- B. Turbidity Barriers: Floating or staked as required.

PART 3 - EXECUTION

3.01 TEMPORARY EROSION CONTROL

- A. See Section 02578 "Solid Sodding."
- B. Refer to Drawings for Erosion Control Details.

3.02 SEDIMENTATION CONTROL

- A. Install and maintain silt fences and dams, traps, barriers, and appurtenances as shown on the approved descriptions and working Drawings. Replace deteriorated hay bales and dislodged filter stone. Repair portions of any devices damaged at no additional expense to the Owner.
- B. Install all sediment control devices in a timely manner to ensure the control of sediment. At sites where exposure to sensitive areas is likely, complete installation of all sediment control devices before starting earthwork.

- C. Use approved temporary erosion control features to correct conditions that develop during Construction that were not foreseen when the Erosion and Sedimentation Control Plan was first approved.
- D. Refer to Drawings for Erosion Control Details.

3.03 TURBIDITY CONTROL

- A. Install and maintain turbidity barriers daily and as described in FDOT Index #103.
- B. Refer to Drawings for Erosion Control Details.

3.04 PERFORMANCE

- A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results that comply with the requirements of the Regulatory agency having jurisdiction, the Owner, and the Professional, the Contractor shall immediately take whatever steps necessary to correct the deficiency at its own expense to protect the Work and any adjacent property to the site, as well as to prevent contamination of any river, stream, lake, tidal waters, reservoir, canal or other water impoundments.
- B. The side slope areas with unstabilized or unprotected soil cover shall be minimized at all times to limit erosion and sedimentation.
- C. Incorporate permanent erosion control features into the Project at the earliest practical time.
- D. Remove temporary erosion and sedimentation controls when the Work is complete and in accordance with the Erosion and Sedimentation Control Plan (Stormwater Pollution Prevention Plan) and the Notice of Termination for Construction Activities is filed with regulatory agencies.

3.05 MAINTENANCE OF EROSION AND CONTROL FEATURES

- A. Provide routine maintenance of permanent and temporary erosion control features, at no expense to the Owner, until the Project is complete and accepted.

END OF SECTION

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**SECTION 02140
DEWATERING**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: This Section specifies the furnishing of equipment; labor and materials necessary to remove storm or subsurface waters from excavation areas in accordance with the requirements set forth, as shown on the Drawings, and/or geotechnical report.

1.02 QUALITY ASSURANCE

- A. Qualifications: The Contractor shall engage a Geotechnical Engineer registered in the State of Florida, to design the temporary dewatering system. The Contractor shall submit conceptual plan for the dewatering system prior to commencing work. The dewatering system installed shall be in conformity with the overall construction plan and certification of this shall be provided by the Geotechnical Engineer. The dewatering system shall be designed by a firm who regularly engages in the design of dewatering systems and who is fully experienced, reputable and qualified in the design of such dewatering systems.
- B. The dewatering of any excavation areas and the disposal of the water shall be in strict accordance with the latest revision of all local and state government rules and regulations.
- C. Permits: The Contractor shall obtain and pay respective fees for all local, state, and federal permits (including the Orange County, and/or South Florida Management District discharge permits) required for the withdrawal, treatment and disposal/discharge of water from the dewatering operation, prior to start of work.
- D. Comply with Florida Administrative Code, Chapter 62-621.300 (2).

PART 2 - SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the County for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
- B. In accordance with FAC 62-621.300(2), submit analytical test results from a certified laboratory for the parameters listed in the FDEP "Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity" to the FDEP and the County. The submitted information shall show the location of the work, where the water will be going to, as well as an estimate for the amount, rate and duration of discharge being proposed.
- C. Provide notification to all jurisdictional permitting agencies in accordance with the requirements of the respective agency.
- D. Provide a detailed plan and operation schedule for dewatering of excavations.

1. Provide descriptive literature of the dewatering system.
2. Provide a plan for erosion and sedimentation control during dewatering.
3. Provide copies of all permits/approvals for disposal/discharge of water during dewatering.

PART 3 - PRODUCTS (NOT USED)

PART 4 - EXECUTION

4.01 GENERAL

- A. The Contractor shall have on-site and available the analytical test results performed in accordance with the FDEP "Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity" (FAC 62-621.300(2)).
- B. The Contractor shall provide adequate equipment for the removal of storm or subsurface waters which may accumulate within the excavation.
- C. The Contractor's attention is directed to the water surface elevations discussed in the reports on subsurface investigations. Water levels will normally vary from season to season. In addition, limited water quality testing results are available. Refer to appendices to these specifications.
- D. The Contractor shall be required to monitor the performance of the dewatering system during the progress of the Work and make such modifications as may be required to assure that the systems will perform satisfactorily. The dewatering system shall be designed in such a manner as to preserve the undisturbed bearing capacity of the sub-grade soils at the bottom of the trench or excavation.
- E. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the County. Approval of the dewatering plan shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils or damage to structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
- F. If subsurface water is encountered, the Contractor shall utilize suitable equipment to adequately dewater the excavation. A wellpoint system or other County acceptable dewatering method shall be utilized if necessary to maintain the excavation in a dry condition for preparation of the trench bottom and for pipe laying. Within and adjacent to residential areas and other areas as required by the County, engines driving dewatering pumps shall be equipped with residential type mufflers and the noise shall not exceed 55 decibels within 50-feet.

4.02 DEWATERING AND DISPOSAL

- A. The Contractor shall construct and place all pipelines, structures, concrete work, structural fill, backfill and bedding material in-the-dry. In addition, the Contractor shall make the final 24-inches of excavation in-the-dry and not until the water level is a minimum of 2-foot below proposed bottom of excavation. For purposes of this Contract, in-the-dry is defined as $\pm 2\%$ of the optimum moisture content of the soil.

- B. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of all water entering excavations. Contractor shall keep excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations.
- C. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
- D. It is expected that dewatering will be required for pre-drainage of the soils prior to final excavation for most of the in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed so that the structure, pipeline or fill will not be floated or otherwise damaged.
- E. If wellpoints are used, Contractor shall adequately space wellpoints to maintain the necessary dewatering. Provide suitable filter sand and/or other means to prevent pumping of fine sands and silts. A continual check shall be maintained by the Contractor to ensure that the subsurface soil is not being removed by the dewatering operations. Pumping from wellpoints shall be continuous and standby pumps shall be provided.
- F. The Contractor's proposed method of dewatering shall include groundwater observation wells to determine the water level during construction. Observation wells shall be installed along pipelines as required to verify depth to water level and at locations approved by the County.
- G. At all times, site grading shall promote drainage. Surface runoff shall be diverted from excavations. Water entering the excavation from the surface shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped or drained by gravity to maintain an excavation bottom free from standing water.
- H. Flotation shall be prevented by the Contractor by maintaining a positive and continuous removal of water. The Contractor shall be fully responsible for all damages which may result from failure to adequately keep excavations dewatered.
- I. The Contractor shall dispose of water from the Work in a suitable manner without damage to adjacent properties or facilities. No water shall be discharged without appropriate treatment for adverse contaminants. No water shall be drained in work built or under construction without prior consent from the County. Water shall be filtered to remove sand and fine soil particles before disposal into any drainage system.
- J. Dewatering of excavations shall be considered incidental to the construction of the Work and all costs shall be included in the various Contract prices in the Bid Form, unless a separate bid item has been established for dewatering.

4.03 GROUNDWATER TREATMENT (IF REQUIRED)

- A. If concentrations of tested groundwater quality parameters exceed those allowable in the FDEP Generic Permit for the Discharge of Produced Groundwater from any Non-

- Contaminated Site Activity (62-621.300(2), F.A.C.), the Contractor shall treat the effluent.
- B. The Contractor shall immediately notify the County and discuss the parameters that exceed allowable limits.
 - C. The Contractor shall meet with the FDEP to determine alternatives that are acceptable to the FDEP.
 - D. The Contractor shall apply for and obtain any and all permits and/or treatment approvals that FDEP requires including but not limited too:
 - 1. Generic Permit for Discharges from Petroleum Contaminated Sites (62-621.300(1)). Allows discharges from sites with automotive gasoline, aviation gasoline, jet fuel, or diesel fuel contamination; or
 - 2. Permit for all Other Contaminated Sites (62-04; 62-302; 62-620 & 62-660). 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; or
 - 3. Generic Permit for the Discharge of Produced Ground Water from Any Non-Contaminated Site Activity (62-621.300(2), F.A.C.); or
 - 4. Generic Permit for Stormwater Discharge from Large or Small Construction Activities (62-621.300(4)(a), F.A.C.); or
 - 5. An Individual Wastewater Permit (62-604.300(8) (a)
 - E. The Contractor shall implement the appropriate treatment that is acceptable to FDEP and County to attain compliance for all excess limits encountered during dewatering activities. Treatment may include, but is not limited to: Chemical, Biological, Electrolysis or any combination of the three.
 - F. The Contractor shall make every effort to minimize the spread of contamination into uncontaminated areas. 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. Ensure provision adhere to all applicable laws, rules or regulations covering hazardous conditions and will be in a manner commensurate with the level of severity of the conditions.
 - G. 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 contaminations issue.
 - H. Delineate the contamination area(s) and 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.
 - I. Maintain jurisdiction over activities inside any delineated contamination areas and any associated staging or holding areas. Be responsible for the health and safety of

workers within the delineated areas. Provide continuous access to representatives of regulatory or enforcement agencies having jurisdiction.

4.04 REMOVAL

Immediately upon completion of the dewatering system, the Contractor shall remove all of his equipment, materials, and supplies from the site of the Work, remove all surplus materials and debris, fill in all holes or excavations, and grade the site to elevations of the surface levels which existed before work started. The site shall be thoroughly cleaned and approved by the County.

END OF SECTION

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**SECTION 02215
FINISH GRADING**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Provide finish grading to all areas within the limits of construction.
- B. Grade sub-soil. Cut out areas to receive stabilizing base course materials for paving and sidewalks. Place, finish grade, and compact topsoil.

1.02 PROTECTION

- A. Prevent damage to existing fencing, trees, landscaping, natural features, benchmarks, pavement, and utility lines. Correct damage at no cost to the County.

1.03 SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the County for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

PART 2 - PRODUCTS

2.01 MATERIALS

- A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.
- B. Topsoil: Friable loam free from subsoil, roots, grass, excessive amount of weeds, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4% and a maximum of 25% organic matter. The topsoil shall be suitable for the proposed plant growth shown on the Drawings and specified. Use topsoil stockpiles on site if conforming to these requirements. If there is not sufficient topsoil available at the project site, the Contractor shall furnish additional fill and topsoil as required to complete the Work at no additional cost to the County.

PART 3 - EXECUTION

3.01 SUB SOIL PREPARATION

- A. Rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Eliminate uneven areas and low spots. Remove debris, roots, branches, stones, etc. Remove sub-soil that has been contaminated with petroleum products.
- B. Cut out areas to subgrade elevation which are to receive stabilizing base for paving and sidewalks.
- C. Bring sub soil to required levels, profiles, and contours. Make changes in grade gradual. Blend slopes into level areas.

- D. Slope grade away from building a minimum of 2-inches in 10-feet unless indicated otherwise on the Drawings.
- E. Cultivate subgrade to a depth of 3-inches where topsoil is to be placed. Repeat cultivation in areas where equipment used for hauling and spreading topsoil has compacted sub-soil.

3.02 PLACING TOPSOIL

- A. Place topsoil in areas where seeding, sodding, and planting is to be performed. Place to the following minimum depths, up to finished grade elevations.
 - 1. 6-inches for seeded areas
 - 2. 4-1/2-inches for sodded areas
 - 3. 24-inches for shrub beds
 - 4. 18-inches for flower beds
- B. Use topsoil in relatively dry state. Place during dry weather.
- C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain levels, profiles, and contours of subgrades.
- D. Remove stones, roots, grass, weeds, debris, and other foreign material while spreading.
- E. Manually spread topsoil around trees, plants, and buildings to prevent damage which may be caused by grading equipment.
- F. Lightly compact placed topsoil.

3.03 SURPLUS MATERIAL

- A. Remove surplus sub soil and topsoil from site.
- B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.

END OF SECTION

SECTION 02220
EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Excavate, backfill, and compact as required for the construction of the utility systems consisting of piping and appurtenances, and structural construction as shown on the Drawings and specified herein. The Contractor shall furnish all labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, compaction, grading, and slope protection to complete the Work. The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, all under ground utilities locations and appurtenances shown on the construction Drawings.
- B. Definitions:
1. Maximum Density: Maximum weight in pounds per cubic foot of a specific material as determined by AASHTO T-180 (ASTM D155).
 2. Optimum Moisture: Percentage of water in a specific material at maximum density.
 3. Rock Excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels, or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.
 4. Suitable: Suitable materials for fills shall be non-cohesive, non-plastic granular local sand and shall be free from vegetation, organic material, marl, silt, hardpan, or muck. The Contractor shall furnish all additional fill material required.
 5. Unsuitable: Unsuitable materials are highly organic soil (peat or muck) classified as A-8 in accordance with AASHTO Designation M 145.
- C. Plan For Earthwork: The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions, the prosecution of the Work, the general and local conditions, and all other matters which can in any way affect the Work under this Contract. Prior to commencing the excavation, the Contractor shall submit a plan of his proposed operations, including maintenance of traffic, to the Owner for review. The Contractor shall consider, and his plan for excavation shall reflect the equipment and methods to be employed in the excavation. The prices established in the Proposal for the Work to be done will reflect all costs pertaining to the Work.

1.02 QUALITY ASSURANCE

- A. Testing laboratory employed by the Owner will make such tests as are deemed advisable. The Contractor shall schedule his work to permit a reasonable time for

testing before placing succeeding lifts and shall keep the laboratory informed of his progress. Costs for initial testing shall be paid by the Owner; however, tests which have to be repeated because of the failure of the tested material to meet specification shall be paid for by the Contractor and the cost of re-testing shall be deducted from payments due the Contractor.

B. Standards

1. AASHTO: American Association of State Highway and Transportation Officials
2. ANSI: American National Standards Institute
3. ASCE: American Society of Civil Engineers
4. ASTM: American Society for Testing and Materials
5. AWWA: American Water Works Association
6. OSHA 29 CFR Subpart P – Excavations and Trenches a) 1926.650, 1926.651, 1926.652
7. OSHA 29 CFR Subpart J - a) 1910.146 for Confined Space Entry

1.03 JOB CONDITIONS

A. Existing Utilities

1. The Contractor is responsible for subsurface verification of existing utilities prior to construction. Locate existing utilities in the area of work in accordance with Sunshine State One Call regulations, Chapter 556, "Underground Facility Damage Prevention and Safety Act", FS.
2. Should uncharted or incorrectly charted piping or other utility be encountered during excavation, notify the Owner. Keep all facilities in operation and repair damaged utilities to the satisfaction of the Owner.
3. Damage and repair costs to such piping or utilities are the Contractor's responsibility.
4. If utilities are to remain in place, the Contractor shall provide adequate means of protection.

B. Test borings and the sub-surface exploration data if previously done on the site will be made available upon request and are for the Contractor's information only.

1.04 PROTECTION

A. Sheeting and Bracing

1. Requirements of the Trench Safety Act shall be adhered to at all times.
2. Furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, to protect adjacent structures and power poles from undermining, and to protect workers from hazardous conditions or other damage. Such support shall consist of braced steel sheet piling, braced wood

lagging and soldier beams or other acceptable methods. If the Owner is of the opinion that at any point sufficient or proper supports have not been provided, the Owner may order additional supports put in at the expense of the Contractor, and compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and compacted. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the Owner.

3. The Contractor shall construct the sheeting outside the neat lines of the foundation unless indicated otherwise for the method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall be adequate to withstand all pressure to which the structure or trench will be subjected. Any movement or bulging which may occur shall be corrected by the Contractor at their own expense so as to provide the necessary clearances and dimensions.
4. Where sheeting and bracing is required to support the sides of excavations for structures, the Contractor shall engage a Professional Geotechnical Engineer, registered in the State of Florida, to design the sheeting and bracing. The sheeting and bracing installed shall be in conformity with the design, and the Professional Engineer shall provide certification of this.
5. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The Contractor shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures because of sheeting installation.
6. The Contractor shall leave in place to be embedded in the backfill all sheeting and bracing not shown on the Drawings but which the Owner may direct him in writing to leave in place at any time during the progress of the Work for the purpose of preventing damage to structures, utilities, or property, whether public or private. The Owner may direct that timber used for sheeting and bracing be cut off at any specified elevation.
7. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, or otherwise as may be directed by the Owner.
8. The right of the Owner to order sheeting and bracing left in place shall not be construed as creating any obligation on the Owner's part to issue such orders, and their failure to exercise this right shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the Work occasioned by negligence or otherwise, growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

9. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than 1-foot above the top of any pipe.
- B. Pumping and Drainage:
1. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fills, structures, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing the water level to return to the natural level as stipulated in Section 02140: Dewatering. The Contractor shall engage a Professional Geotechnical Engineer registered in the State of Florida to design the dewatering systems. The Contractor shall submit to the Owner for a plan for dewatering systems prior to commencing work. The dewatering system installed shall be in conformity with the overall construction plan, and the Professional Engineer shall provide certification of this. The Professional Engineer shall be required to monitor the performance of the dewatering systems during the progress of the Work and require such modifications as may be required to assure that the systems are performing satisfactorily.
 2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at the proposed bottom of excavation and to preserve the integrity of adjacent structures. Dewatering by trench pumping will not be permitted if migration of fine grained natural material from bottom, sidewalls, or bedding material will occur.
 3. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a bottom free from standing water.
 4. The Contractor shall take all additional precautions to prevent uplift of any structure during construction.
 5. Permission to use any storm sewers or drains for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. However, the Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the Owner or the authority having jurisdiction, at no cost to the Owner.
 6. The Contractor shall prevent flotation by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.
 7. Removal of dewatering equipment shall be accomplished after compaction/density testing has been completed and the system is no longer required. The Contractor shall remove the material and equipment constituting the system.

8. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, or other contaminants in order to prevent adverse effects on groundwater quality.

1.05 TESTING AND INSPECTION SERVICE

- A. The Owner will provide a geotechnical testing and inspection service. The services include testing soil materials and quality control testing during filling and backfilling operations. Samples of soil materials shall be furnished to the testing service by the Contractor. The Owner shall pay costs of initial geotechnical testing. The Contractor shall pay for any subsequent testing required due to failure and laboratory stand-by charges incurred.
- B. The Owner will receive the density testing reports and will provide a copy to the Contractor. Density testing reports that indicate failure to meet specifications will result in rejection of the Work installed until such time that density re-testing indicates compliance. Density re-testing will be repeated at the Contractors expense.
- C. Density testing scheduled subsequent to backfilling activities shall be coordinated with, and witnessed by the Owner. Failure by the Contractor to coordinate or have the Owner present shall result in rejection of the density testing reports and re-testing at the Contractor's expense.
- D. Dewatering systems shall not be removed until compaction/density testing has been completed.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. General:
 1. All fill material shall be subject to the review and acceptance of the Owner.
 2. All fill material shall be free of organic material, trash, or other objectionable material. The Contractor shall remove excess or unsuitable material from the job site.
 3. Contractor shall furnish additional work fill as required to complete the work at no additional cost to the County. There shall be no burrow or cut on site except to achieve the grading shown on the Drawings.
- B. Common Fill Material: Common fill shall consist of mineral soil, substantially free of clay, organic material, muck, loam, wood, trash, and other objectionable material which may be compressible or which cannot be compacted properly. Common fill shall not contain stones larger than 3-1/2-inches in any dimension in the top 12-inches or 6-inches in any dimension in the balance of fill area. Common fill shall not contain asphalt, broken concrete, masonry, rubble or other similar materials. It shall have physical properties that allow it to be easily spread and compacted during filling. Additional common fill shall be no more than 12 % by weight finer than the No. 200 mesh sieve, unless finer material is approved for use in a specific location by the Owner. Select Common Fill shall be as specified as above from common fill, except that the material shall contain no stones larger than 1/2-inches in largest dimension, and shall be no more than 5 % by weight finer than the No. 200 mesh sieve.

- C. Structural Fill: Structural fill shall be reasonably well graded sand to gravelly sand having the following gradation:

US Sieve Size	Percent Passing By Weight
No. 1	100
No. 4	75 - 100
No. 40	15 - 80
No. 100	0 - 30
No. 200	0 - 12

- D. Class 1 Soils*: Manufactured angular, granular material, 1/4 to 1-1/2-inches (6 to 4 mm) size, including materials having significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Sieve analysis for crushed stone is given below separately.

Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay, loam or organic matter, conforming to ASTM C33 stone size No. 89 and with particle size limits as follows:

U.S. Sieve Size	% Passing By Weight
1/2	100
3/8	100
No. 4	20 - 25
No. 8	5 - 30
No. 16	0 - 10
No. 50	0 - 2

- E. Class II Soils**:

1. GW: Well graded gravels and gravel-sand mixtures, little or no fines. Fifty percent or more retained on No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
2. GP: Poorly graded gravels and gravel-sand mixtures, little or no fines. Fifty percent or more retained on No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
3. SW: Well graded sands and gravelly sands, little or no fines. More than passes No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
4. SP: Poorly graded sands and gravelly sands, little or no fines. More than 50 % passes No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.

*Soils defined as Class I materials are not defined in ASTM D2487.

**In accordance with ASTM D2487, less than 5 % pass No. 200 sieve.

- F. Coarse Sand: Sand shall consist of clean mineral aggregate with particle size limits as follows:

U.S. Sieve Size	Percent Passing By Weight
3/8	100
No. 10	85 – 100
No. 40	20 – 40
No. 200	0 - 12

- A. Other Material: All other material, not specifically described, but required for proper completion of the Work shall be selected by the Contractor and acceptable by the Owner.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clearing:

1. The construction areas shall be cleared of all obstructions and vegetation including large roots and undergrowth within 10-feet of the lines of the excavation.
2. Strip and stockpile topsoil on the site at the location to be determined by the Owner.

3.02 EXCAVATION

- A. General: Excavations for roadways, structures, and utilities must be carefully executed in order to avoid interruption of utility service.

B. Excavating for Roadways/Structures/Utilities:

1. Excavation shall be made to such dimensions as will give suitable room for building the foundations and the structures, for bracing and supporting, for pumping and draining, and for all other work required.
 - a. Excavation for precast or prefabricated structures shall be carried to an elevation 2-feet lower than the proposed outside bottom of the structure to provide space for the select backfill material. Prior to placing the select backfill, the excavation shall be measured by the Owner to verify that the excavation has been carried to the proper depth and is reasonably uniform over the area to be occupied by the structure.
 - b. Excavation for structures constructed or cast in place in dewatered excavations shall be carried down to the bottom of the structure where dewatering methods are such that a dry excavation bottom is exposed and the naturally occurring material at this elevation leveled and left ready to receive construction. Material disturbed below the founding elevation in dewatered excavations shall be replaced with Class B concrete.
 - c. Footings: Cast-in-place concrete footing sides shall be formed immediately after excavation.

2. Immediately document the location, elevation, size, material type and function of all new subsurface installations, and utilities encountered during the course of construction.
3. Excavation equipment operators and other concerned parties shall be familiar with subsurface obstructions as shown on the Drawings and should anticipate the encounter of unknown obstructions during the course of the Work.
4. Encounters with subsurface obstructions shall be hand excavated.
5. Excavation and dewatering shall be accomplished by methods that preserve the undisturbed state of subgrade soils. Subgrade soils which become soft, loose, "quick" or otherwise unsatisfactory for support of structures as a result of inadequate dewatering or other construction methods shall be removed and replaced by crushed stone as required by the Owner at the Contractor's expense.
6. The bottom of excavations shall be rendered firm and dry before placing any piping or structure.
7. All pavements shall be cut with saws or approved power tools prior to removal.
8. Excavated material shall be stockpiled in such a manner as to prevent nuisance conditions. Surface drainage shall not be hindered. Excavated material not suitable for backfill shall be removed from the site and disposed of by the Contractor.

3.03 DRAINAGE

- A. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations, and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition. The dewatering method used shall prevent disturbance of earth below grade.
- B. All water pumped or drained from the Work shall be disposed of in a suitable manner without undue interference with other work, without damage to surrounding property, and in accordance with pertinent rules and regulations.
- C. No construction, including pipe laying, shall be allowed in water. No water shall be allowed to contact masonry or concrete within 24-hours after being placed. The Contractor shall constantly guard against damage due to water and take full responsibility for all damage resulting from his failure to do so.
- D. The Contractor will be required at his expense to excavate below grade and refill with crushed stone (gradation 57 or 89) or other acceptable fill material if the Owner determines that adequate dewatering has not been provided.

3.04 UNDERCUT

- A. If the bottom of any excavation is below that shown on the Drawings or specified because of Contractor error, convenience, or unsuitable subgrade due the Contractor's excavation methods, he shall refill to normal grade with fill at his own cost. Fill material and compaction method shall be approved by the Owner.

3.05 FILL AND COMPACTION

- A. Compact and backfill excavations and construct embankment according to the following schedule. (Modified Proctor standard shall be ASTM D-1557):

STRUCTURES AND ROADWORK

Area	Material	Compaction
Beneath Structures	Structural Fill	12-inch lifts, compacted to 98% maximum density as determined by AASHTO T-180. Fill Should not be placed over any in-place soils until those deposits have been compacted to 98% Modified Proctor.
Around Structures	Structural Fill	12-inch lifts, 95% of maximum density as determined by AASHTO T-180. Rubber Tire or vibratory plate compactors shall be used
Beneath Paved Surfaces	Common Fill	12-inch lifts, 98% by maximum density as determined by AASHTO T-180 or as required by the FDOT Standards.
Open Areas	Common Fill	12-inch lifts, 95% by maximum density as determined by AASHTO T-180.

- B. Pipe shall be laid in open trenches unless otherwise indicated on the Drawings or elsewhere in the Contract Documents.
- C. Excavations shall be backfilled to the original grade or as indicated on the Drawings. Deviation from this grade because of settling shall be corrected. The backfill operation shall be performed to comply with all rules and regulations and in such a manner that it does not create a nuisance or safety hazard.
- D. Embankments shall be constructed true to lines, grades, and cross sections shown on the plans or ordered by the Owner. Embankments shall be placed in successive layers of not more than 8-inches in thickness, loose measure, for the full width of the embankment. As far as practicable, traffic over the Work during the construction phase shall be distributed so as to cover the maximum surface area of each layer.
- E. If the Contractor requests approval to backfill material utilizing lifts and/or methods other than those specified herein, such request shall be in writing to the Owner. Acceptance will be considered only after the Contractor has performed tests, at the Contractor's expense, to identify the material used and density achieved throughout the backfill area utilizing the method of backfill requested. The Owner's acceptance shall be in writing.
- F. One compaction test location shall be required for each 200 linear feet of pipe and for every 100 square feet of backfill around structures as a minimum. The Owner may determine that more compaction tests are required to certify the installation depending on field conditions. The locations of the compaction tests within the trench shall be in conformance with the following schedule:
 1. At least one test at the spring line of the pipe.
 2. At least one test for each 12-inch layer of backfill within the pipe bedding zone for pipes 24-inches and larger.

3. One test at an elevation of 1-foot above the top of pipe.
4. One test for each 2-feet of backfill placed from 1-foot above the top of the pipe to finished grade elevation.
5. Density testing is required for sanitary sewer manholes. Tests shall be staggered around the manhole within 3-feet of the structure's outside diameter.
 - a. First test shall be 1-foot above the structure base.
 - b. Second test shall be 2-feet above the first test and subsequent tests every 2-feet up the finished grade.
6. The Contractor shall provide additional compaction and testing prior to commencing further construction if the Owner's testing reports and inspection indicate that the fill has been placed below specified density.
7. The Contractor shall coordinate testing with the Owner approved testing laboratory and shall provide monthly test results to the Owner in a timely manner during construction activities. Density testing scheduled subsequent to backfilling activities shall be coordinated with the Owner and witnessed by the Owner representative. Failure by the Contractor to coordinate or have the Owner representative present shall result in rejection of the submitted density testing reports and re-testing at the Contractor's expense. Density testing reports not submitted in a timely manner shall result in rejection of the pipe installed and rejection of the density testing reports until such time that density re-testing is coordinated and repeated at the Contractor's expense as deemed necessary by the Owner's representative.
8. Dewatering systems shall not be removed until compaction/density testing has been completed.

END OF SECTION

**SECTION 02230
SITE PREPARATION**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Site clearing, tree protection, stripping topsoil, demolition, grubbing, and otherwise preparing the project site for construction operations

B. Related Specification Sections include but are not necessarily limited to:

1. Orange County Utilities- Bidding Requirements, Contract Forms, and Conditions of the Contract Documents
2. Division 01 - General Requirements
3. Section 02215 - Finish Grading
4. Section 02220 - Excavating, Backfilling, and Compacting
5. Section 02100 - Erosion and Sedimentation Control

C. Clearing: Remove and dispose of trees, shrubs, brush, limbs, and other vegetative growth. Remove all evidence of their presence from the surface including sticks and branches. Remove and dispose of trash piles and rubbish that currently is scattered over the construction site or collects there during construction. Protect trees, shrubs, vegetative growth, and fencing which are not designed for removal. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, so as to provide for safety of employees and others.

D. Grubbing: Grubbing shall consist of the complete removal of all tree stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs, and any other organic or metallic debris remaining after clearing not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

E. Stripping: Remove and dispose of all organics and sod, topsoil, grass, and grass roots, and other objectionable material remaining after clearing and grubbing from the areas designated to be stripped. Grass, grass roots and organic material in areas to be excavated or filled upon shall be stripped of to the depth as noted in the soils report.

In areas so designated, topsoil shall be stockpiled. Strippings and unsuitable material, such as organic material, shall be disposed of by the Contractor unless directed otherwise by the Engineer.

PART 2 - PRODUCTS

2.01 GENERAL

- A. Trees and Shrubbery: Existing trees, shrubbery, and other vegetative material may not be shown on the Drawings. Inspect the site as to the nature, location, size, and extent of vegetative material to be removed or preserved, as specified herein. Preserve, in place, trees that are specifically shown on the Drawings and designated to be preserved.
- B. Preservation of Trees, Shrubs, and Other Plant Material:
 - 1. All plant materials (trees, shrubbery, and plants) beyond the limits of clearing and grubbing shall be saved and protected from damage resulting from the work. No filling, excavating, trenching, or stockpiling of materials will be permitted within the drip line of these plant materials. The drip line is defined as a circle drawn by extending a line vertically to the ground from the outermost branches of a plant or group of plants. To prevent soil compaction within the drip line area, no equipment will be permitted within this area.
 - 2. When trees are close together, restrict entry to area with drip line by fencing. In areas where no fence is erected, the trunks of all trees 2 inches or greater in diameter shall be protected by encircling the trunk entirely with boards held securely by 12-gauge wire and staples. This protection shall extend from ground level to a height of 6 feet. Cut and remove tree branches where such cutting is necessary to affect construction operation. Remove branches other than those required to affect the work to provide a balanced appearance of any tree. Scars resulting from the removal of branches shall be treated with a tree sealant.

PART 3 - EXECUTION

3.01 PREPARATION

- A. Protect existing trees and other vegetation to remain against damage.
 - 1. Do not smother trees by stockpiling construction materials or excavated materials within drip line.
 - 2. Avoid foot or vehicular traffic or parking of vehicles within drip line.
 - 3. Provide temporary protection as required.

- B. Repair or replace trees and vegetation damaged by construction operations.
 - 1. Repair to be performed by a qualified tree surgeon.
 - 2. Remove trees which cannot be repaired and restored to full-growth status.
 - 3. Replace with new trees of minimum 4 IN caliper.
- C. Owner will obtain authority for removal and alteration work, if any, on adjoining property.

3.02 SITE CLEARING

- A. Topsoil Removal:
 - 1. Strip topsoil to depths encountered.
 - a. Remove heavy growths of grass before stripping.
 - b. Stop topsoil stripping sufficient distance from such trees to prevent damage to main root system.
 - c. Separate from underlying subsoil or objectionable material.
 - 2. Areas to be Stripped: All excavation and embankment areas associated with new structures, slabs, walks, and roadways shall be stripped. Stockpile areas shall be stripped.
 - 3. Stockpile topsoil where directed by Engineer.
 - a. Construct storage piles to freely drain surface water.
 - b. Seed or cover storage piles to prevent erosion.
 - 4. Do not strip topsoil in wooded areas where no change in grade occurs.
 - 5. Borrow topsoil: Reasonably free of subsoil, objects over 2 IN DIA, weeds and roots.
- B. Clearing and Grubbing:
 - 1. Clear from within limits of construction all trees not marked to remain.
 - 2. Grub (remove) from within limits of construction under areas to be paved and all excavation areas associated with new structures, slabs, underground piping, and roadways shall be cleared and grubbed to the following depths:
 - a. Driveway and Paved Area: Clear and grub to depths as specified previously. Organic soil shall be removed to a depth of at least 2 feet below the roadway subgrade level. All organic soil shall be replaced with compacted backfill.
 - b. All other areas: 1 foot below completed surface and replace with compacted backfill.

C. Disposal of Waste Materials:

1. Do not burn combustible materials on site.
2. Remove all waste materials from site, including cleared and grubbed, and dispose of in accordance with all local laws, codes, and ordinances.
3. Disposal of Strippings: Remove all stripped material and dispose off-site, unless otherwise directed to stockpile material.
4. Do not bury organic matter on site.

3.03 ACCEPTANCE

- A. Upon completion of the site clearing, obtain Engineer's acceptance of the extent of clearing, depth of stripping and rough grade.
- B. Contractor is responsible to supply fill material necessary to achieve finish grade.

END OF SECTION

**SECTION 02320
TRENCHING, BEDDING AND BACKFILLING**

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes:

1. Excavation, trenching, bedding and backfilling for underground utilities.

B. Related Specification Sections include but are not necessarily limited to:

1. Orange County- Bidding Requirements, Contract Forms, and Conditions of the Contract Documents
2. Division 01 - General Requirements
3. Division 16 - Electrical

1.02 QUALITY ASSURANCE

A. Referenced Standards:

1. ASTM International (ASTM):

- a. C33, Standard Specification for Concrete Aggregates
- b. D698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
- c. D1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft³ (2,700 kN-m/m³))
- d. D4253, Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
- e. D4254, Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density

B. Comply fully with Florida Trench Safety Act.

C. Refer to Appendix F for Florida Gas Transmission main crossing requirements.

1.03 DEFINITIONS

A. Excavation: All excavation will be defined as unclassified.

1.04 SUBMITTALS

A. Shop Drawings:

1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.
2. Product technical data including:
 - a. Acknowledgement that products submitted meet requirements of standards referenced.

- b. Manufacturer's installation instructions.
 - 3. Submit respective pipe or conduit manufacturer's data regarding bedding methods of installation and general recommendations.
 - 4. Submit sieve analysis reports on all granular materials.
- B. Miscellaneous Submittals:
 - 1. See Specification Section 01300 for requirements for the mechanics and administration of the submittal process.

1.05 PROJECT SITE CONDITIONS

- A. Avoid overloading or surcharge a sufficient distance back from edge of excavation to prevent slides or caving.
 - 1. Maintain and trim excavated materials in such manner to be as little inconvenience as possible to property owners.
- B. Provide full access to public and private premises and fire hydrants, at roadways, parking areas, sidewalks and other points as designated by Owner to prevent serious interruption of travel.
- C. Protect and maintain bench marks, monuments or other established points and reference points and if disturbed or destroyed, replace items to full satisfaction of Owner and controlling agency.
- D. Verify location of existing underground utilities.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Backfill Material:
 - 1. As approved by Engineer.
 - a. Free of rock cobbles, roots, sod or other organic matter material.
 - b. Moisture content at time of placement: 3 percent plus/minus of optimum moisture content as specified in accordance with ASTM D698.
- B. Subgrade Stabilization Materials: Provide subgrade stabilization material consisting of high bearing value soil, sand-clay, ground limestone, crushed limerock, coquina, or any other material suitable for stabilization. Muck shall not be used.
- C. Bedding Materials:
 - 1. As approved by the Engineer.
 - 2. Granular bedding materials:
 - a. ASTM D2321 Class 1B.
 - i. Well-graded crushed stone.
 - b. ASTM C33, gradation 67 (3/4 IN to No. 4 sieve) or FDOT No. 57 Stone as directed by Engineer.

3. Flowable fill:
 - a. Description: Flowable fill shall be a mixture of cement, fly ash, fine sand, water, and air having a consistency which will flow under a very low head.
 - b. Material characteristics:
 - i. The approximate quantities of each component per cubic yard of mixed material shall be as follows:
 - I.* Cement (Type I or II): 50 LBS.
 - II.* Fly ash: 200 LBS.
 - III.* Fine sand: 2,700 LBS.
 - IV.* Water: 420 LBS.
 - V.* Air content: 10 percent.
 - ii. Actual quantities shall be adjusted to provide a yield of 1 cubic yard with the materials used.
 - iii. Approximate compressive strength should be 85 to 175 psi.
 - iv. Fine sand shall be an evenly graded material having not less than 95 percent passing the No. 4 sieve and not more than 5 percent passing the No. 200 sieve.

PART 3 - EXECUTION

3.01 GENERAL

- A. Remove and dispose of materials determined to be unsuitable, as directed by Engineer, off site.

3.02 EXCAVATION

- A. Unclassified Excavation: Remove muck materials, clay, silt, gravel, hard pan, and loose rock or stone as directed by Engineer.
- B. Excavation for Appurtenances:
 1. 12 IN (minimum) clear distance between outer surface and embankment.
 2. See Specification Section 02230 for applicable requirements.
- C. Groundwater Dewatering:
 1. Where groundwater is, or is expected to be, encountered during excavation, install a dewatering system to prevent softening and disturbance of subgrade to allow subgrade stabilization, pipe bedding and backfill material to be placed in the dry, and to maintain a stable trench wall or side slope.
 2. Groundwater shall be drawn down and maintained at least 2 FT below the bottom of any trench or manhole excavation prior to excavation.
 3. Review soils investigation before beginning excavation and determine where groundwater is likely to be encountered during excavation.
 - a. Employ dewatering specialist for selecting and operating dewatering system.

4. Keep dewatering system in operation until dead load of pipe, structure and backfill exceeds possible buoyant uplift force on pipe or structure.
5. Dispose of groundwater to an area which will not interfere with construction operations or damage existing construction and in accordance with current permits and regulatory requirements.
6. Install groundwater monitoring wells as necessary.
7. Shut off dewatering system at such a rate to prevent a quick upsurge of water that might weaken the subgrade.
8. Cost of groundwater dewatering shall be included in the lineal foot unit price of the pipe installation.

D. Trench Excavation:

1. Excavate trenches by open cut method to depth shown on Drawings and necessary to accommodate work.
 - a. Support existing utility lines and yard piping where proposed work crosses at a lower elevation.
 - i. Stabilize excavation to prevent undermining of existing utility and yard piping.
2. Open trench outside buildings, units, and structures:
 - a. No more than the distance between two manholes, structures, units, or 200 LF, whichever is less.
 - b. Field adjust limitations as weather conditions dictate.
3. Any trench or portion of trench, which is opened and remains idle for seven (7) calendar days, or longer, as determined by the Owner, may be directed to be immediately refilled, without completion of work, at no additional cost to Owner.
 - a. Said trench may not be reopened until Owner is satisfied that work associated with trench will be prosecuted with dispatch.
4. Observe following trenching criteria:
 - a. Trench size:
 - i. Excavate width to accommodate free working space.
 - ii. Maximum trench width at top of pipe or conduit may not exceed outside diameter of utility service by more than the following dimensions:
 - iii. Cut trench walls vertically from bottom of trench to 1 FT above top of pipe, conduit, or utility service.
 - iv. Keep trenches free of surface water runoff.

I. Include cost in Bid.

II. No separate payment for surface water runoff pumping will be made.

E. Trenching for Electrical Installations:

1. Observe the preceding Trench Excavation paragraph in PART 3 of this Specification Section.
2. Modify for electrical installations as follows:
 - a. Open no more than 200 LF of trench in exterior locations for trenches more than 12 IN but not more than 30 IN wide.
 - b. Any length of trench may be opened in exterior locations for trenches which are 12 IN wide or less.
 - c. Do not over excavate trench.
 - d. Cut trenches for electrical runs with minimum 30 IN cover, unless otherwise specified or shown on Drawings.
 - e. See Division 16 for additional requirements.

F. Flowable Fill:

1. Flowable fill shall be:
 - a. Discharged from a mixer by any means acceptable to the Engineer into the area to be filled.
 - b. Placed in 4 FT maximum lifts to the elevations indicated.
 - i. Allow 12 HR set-up time before placing next lift or as approved by the Engineer.
 - ii. Contractor shall place flowable fill lifts in such a manner as to prevent flotation of the pipe.
2. Subgrade on which flowable fill is placed shall be free of disturbed or softened material and water.
3. Flowable fill batching, mixing, and placing may be started if weather conditions are favorable, and the air temperature is 34 DegF and rising.
4. At the time of placement, flowable fill must have a temperature of at least 40 DegF.
5. Mixing and placing shall stop when the air temperature is 38 DegF or less and falling.
6. Each filling stage shall be as continuous an operation as is practicable.
7. Contractor shall prevent traffic contact with flowable fill for at least 24 HRS after placement or until flowable fill is hard enough to prevent rutting by construction equipment.
8. Flowable fill shall not be placed until water has been controlled or groundwater level has been lowered in conformance with the requirements of Dewatering in specification 02240.

3.03 PREPARATION OF FOUNDATION FOR PIPE LAYING

A. Over-Excavation:

1. Backfill and compact to 95 percent (98 percent under pavement, sidewalks, and slabs) of maximum dry density per AASHTO T-180.
2. Backfill with granular bedding material as option.

- B. Unclassified Excavation (unsuitable):
 - 1. Excavate minimum of 6 IN below bottom exterior surface of the pipe or conduit.
 - 2. Backfill to grade with suitable earth or granular material.
- C. Subgrade Stabilization:
 - 1. Stabilize the subgrade by compacting to 95 percent (98 percent under pavement, sidewalks, and slabs) per AASHTO T-180. See Type B bedding and trenching detail.
 - 2. Observe the following requirements when unstable trench bottom materials are encountered.
 - a. Notify Owner when unstable materials are encountered.
 - i. Define by drawing station locations and limits.
 - b. Remove unstable trench bottom caused by Contractor failure to dewater, rainfall, or Contractor operations.
 - i. Replace with subgrade stabilization with no additional compensation.
- D. Pipe Bedding
 - 1. Where Contractor cannot achieve dewatering and/or compaction requirement(s), Type A bedding and trenching detail shall be used at no loss to Owner.
 - 2. Form bell holes in trench bottom to eliminate point loading and allow pipe to fully rest on bedding or subgrade.

3.04 BACKFILLING METHODS

- A. Do not backfill until tests to be performed on system show system is in full compliance to specified requirements. Refer to Type A and Type B bedding and trenching detail.
- B. Carefully Compacted Backfill:
 - 1. Furnish where indicated on Drawings, specified for trench embedment conditions and for compacted backfill conditions up to 12 IN above top of pipe or conduit.
 - 2. Comply with the following:
 - a. Place backfill in lifts not exceeding 12 IN (loose thickness).
 - b. Hand place, shovel slice, and pneumatically tamp all carefully compacted backfill.
 - c. Observe specific manufacturer's recommendations regarding backfilling and compaction.
 - d. Compact each lift to specified requirements.
- C. Common Trench Backfill:

1. Perform in accordance with the following:
 - a. Place backfill in lift thicknesses capable of being compacted to densities specified.
 - b. Observe specific manufacturer's recommendations regarding backfilling and compaction.
 - c. Avoid displacing joints and appurtenances or causing any horizontal or vertical misalignment, separation, or distortion.
- D. Water flushing for consolidation is not permitted.
- E. Backfilling for Electrical Installations:
 1. Observe the preceding Carefully Compacted Backfill paragraph or Common Trench Backfill paragraph in PART 3 of this Specification Section or when approved by the Engineer.
 2. Modify for electrical installation as follows:
 - a. Observe notes and details on electrical drawings for fill in immediate vicinity of direct burial cables.

3.05 COMPACTION

A. General:

1. Place and assure bedding, backfill, and fill materials achieve an equal or higher degree of compaction than undisturbed materials adjacent to the work.
2. In no case shall degree of compaction below minimum compactions specified be accepted.

B. Compaction Requirements:

1. Unless noted otherwise on Drawings or more stringently by other Specification Sections, comply with following minimum trench compaction criteria.
 - a. Bedding material:

LOCATION	COMPACTION DENSITY
All locations	75 percent of maximum relative density by ASTM D4253 and ASTM D4254

b. Carefully compacted backfill:

LOCATION	COMPACTION DENSITY
All applicable areas	95 percent (98 percent under pavement, sidewalks, and slabs) of maximum dry density by AASHTO T-180

c. Common trench backfill:

LOCATION	SOIL TYPE	COMPACTION DENSITY
Under pavements, roadways, surfaces within highway right-of-ways	Cohesive soils	98 percent of maximum dry density by AASHTO T-180
Under turfed, sodded, plant seeded, nontraffic areas	Cohesive soils	95 percent of maximum dry density by AASHTO T-180

3.06 FIELD QUALITY CONTROL

A. Testing:

1. Perform tests through recognized testing laboratory provided by Owner.
2. Perform additional tests as directed until compaction meets or exceeds requirements.
3. Cost associated with "Failing" tests shall be paid by Contractor.
4. Assure immediate access for testing of all soils related work.
5. Ensure excavations are safe for testing personnel.

END OF SECTION

**SECTION 02576
CONCRETE SIDEWALKS AND DRIVEWAYS**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Constructing new concrete sidewalks, driveways, and curb and gutters as shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. Codes and Standards: Comply with applicable sections of F.D.O.T. Specifications and local governing regulations.
- B. The mixture, placement, and curing of all concrete work shall be in accordance with F.D.O.T. Specifications.

1.03 SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the Owner for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300: Submittals.
- B. Furnish manufacturer's product data, design mixes, test reports, and materials certifications.

1.04 JOB CONDITIONS

- A. Utilize flagman, barricades, warning signs, and warning lights as required.

1.05 GUARANTEE

- A. All restored areas within the public right-of-way shall be guaranteed for 1-year after final acceptance. In the event of cracked or broken concrete surfaces, the Contractor shall make the necessary repairs to restore the concrete within 10-calendar days after notification by the Owner. The cost of such repairs shall be paid by the Contractor.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All material supplied shall be one of the products specified in Appendix D: List of Approved Products appended to these technical specifications.

2.02 CONCRETE MATERIALS

- A. Forms: Steel or wood for each type of use of size and strength to resist movement during concrete placement and to retain horizontal and vertical alignment until removal. Use straight forms, free of distortion and defects.
 - 1. Use flexible spring steel forms or laminated boards to form radius bends as required.

2. Coat forms with a non-staining form release agent that will not discolor or deface the surface of the concrete.
- B. Fibermesh Reinforcement: Fibermesh reinforcement fibers shall be 2-inches to 3-inches collated polypropylene fibers. Fibers shall be in strict accordance with the manufacturer recommendations and within the time as specified in ASTM C94, Type III 4.13 and applicable building codes.
- C. Concrete Materials: Comply with requirements of F.D.O.T. Section 347 for concrete materials, admixtures, bonding materials, curing materials, and others as required.
- D. Epoxy Resin Grout: Type N as specified in F.D.O.T. Section 926.
- E. Aggregate, brick, or other material required to match existing driveway or walk shall be as approved by the Owner.

2.03 CONCRETE MIX, DESIGN, AND TESTING

- A. Comply with requirements of applicable F.D.O.T. Section 347 for concrete mix design, sampling and testing, and quality control, and as herein specified.
- B. Design the mix to produce standard weight concrete consisting of Portland cement, aggregate, air entraining admixture, and water to produce the following properties.
 1. Compressive Strength: Class B, 3,000 psi for walks and curbs
 2. Compressive Strength: Class A, 4,000 psi for driveways
 3. Air Content: 3% to 6%
- C. Concrete slump shall not exceed plus or minus 1-inch from approved design slump.

PART 3 - EXECUTION

3.01 CONCRETE SIDEWALK, DRIVEWAY, AND CURB AND GUTTER

- A. Surface Preparation:
 1. Remove loose material from the compacted sub base surface immediately before placing concrete.
 2. Proof-roll prepared sub base surface to check for unstable areas and the need for additional compaction. Do not begin paving work until such conditions have been corrected and are ready to receive paving.
- B. Form Construction:
 1. Set forms to the required grades and lines, rigidly braced and secured. Install sufficient quantity of forms to allow continuous progress of the Work and so that forms can remain in place at least 24-hours after concrete placement.
 2. Check completed form work for grade alignment to the following tolerances:
 - a. Top of forms not more than 1/8-inch in 10-feet.
 - b. Vertical face on longitudinal axis, not more than 1/4-inch in 10-feet.
 3. Clean forms for reuse immediately after use, and coat with form release agent as often as required to ensure separation from concrete without damage.

C. Concrete Placement:

1. Do not place concrete until sub base and forms have been checked for line and grade. Moisten if required to provide a uniform dampened condition at the time concrete is placed. Do not place concrete around manholes or other structures until they are completed to required finish elevation and alignment. Use special colors or aggregate as required to match existing material.
2. Place concrete using methods which prevent segregation of the mix. Consolidate concrete along the face of forms and adjacent to transverse joints with an internal vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms. Use only square-faced shovels for hand spreading and consolidation. Consolidate with care to prevent dislocation of reinforcing, dowels, and joint devices. Do not use vibrators to push or move concrete in forms or chute.
3. Deposit and spread concrete in a continuous operation between transverse joints, as far as possible. If interrupted for more than 1/2-hour, place a construction joint.
4. An automatic machine may be used for sidewalk or curb and gutter placement at Contractor's option. If machine placement is to be used, submit revised mix design and laboratory test results which meet or exceed the minimum herein specified. Machine placement must produce sidewalks and/or curbs and gutters to the required cross-section, lines, grades, finish, and jointing as specified for formed concrete. If results are not acceptable, remove and replace with formed concrete as specified.
5. Joints: Construct expansion, weakened-plane (contraction), and construction joints true-to-line with face perpendicular to surface of the concrete, unless otherwise indicated. Construct transverse joints at right angles to the centerline, unless otherwise indicated. When joining existing structures place transverse joints to align with previously placed joints, unless otherwise indicated.
 - a. Weakened-Plane Joints: Provide weakened-plane (contraction) joints sectioning concrete into areas as shown on the Drawings. Construct weakened plane joints for a depth equal to at least 1/4 concrete thickness, by sawing within 24-hours of placement or formed during finishing operations. Place joints at intervals not to exceed 10-feet if not otherwise indicated.
 - b. Construction Joints: Place construction joints at the end of all pours and at locations where placement operations are stopped for a period of more than 1/2-hour, except where such pours terminate at expansion joints. Construction joints shall be as shown or, if not shown, use standard metal keyway-section form of appropriate height.
 - c. Expansion Joints:
 - i. Provide premolded joint filler for expansion joints abutting concrete curbs, catch basin, manholes, inlets, structures, walks, and other fixed objects, unless otherwise indicated.

- ii. Locate expansion joints at 12-feet on center for concrete walks unless otherwise indicated.
- iii. Extend joint fillers full-width and depth of joint, and not less than 1/2-inch below finished surface where joint sealer is indicated. If no joint sealer, place top of joint filler flush with finished concrete surface.
- iv. Furnish joint fillers in one-piece lengths for the full width being placed, wherever possible. Where more than one length is required, lace or clip joint filler sections together. Pieces shorter than 4-inches shall not be used unless specifically shown as such.
- v. Protect the top edge of the joint filler during concrete placement with a metal cap or other temporary material. Remove protection after concrete has been placed on both sides of joint.
- vi. Fillers and Sealants: Comply with the requirements of these specifications for preparation of joints, materials installation, and performance, and as herein specified.

D. Concrete Finishing:

1. After striking-off and consolidating concrete, smooth the surface by screening and floating. Use hand methods only where mechanical floating is not possible. Adjust the floating to compact the surface and produce a uniform texture.
2. After floating, test surface for trueness with a 20-foot straightedge. Variations exceeding 1/3-inch for any two points within 10-feet shall not be acceptable. Distribute concrete as required to remove surface irregularities, and refloat repaired areas to provide a continuous smooth finish.
3. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging tool, and round 10-1/2-inch radius, unless otherwise indicated. Eliminate any tool marks on concrete surface.
4. After completion of floating and when excess moisture or surface sheen has disappeared, broom finish sidewalks by drawing a fine-hair broom across concrete surface, perpendicular to a line of pedestrian traffic. If the existing material has another finish, match existing finish.
5. Do not remove forms for 24-hours after concrete has been placed. After form removal, clean ends of joints and point up any minor honeycombed areas.

E. Curing:

Protect and cure finished concrete paving and walks, complying with applicable requirements of F.D.O.T. Section 350. Use moist-curing methods for initial curing of approved concrete curing compounds whenever possible.

F. Repairs and Protections:

1. Repair or replace broken or defective concrete, as directed by the Owner.

2. Drill test cores where directed by the Owner, when necessary to determine magnitude of cracks or defective areas. Fill drilled core holes in satisfactory pavement areas with Portland cement concrete bonded to pavement with epoxy resin grout.
3. Protect concrete from damage until acceptance of work. When construction traffic is permitted, maintain pavement as clean as possible by removing surface stains and spillage of materials as they occur.
4. Sweep concrete pavement and wash free of stains and discolorations, dirt, and other foreign material just prior to final inspection.

3.02 FIELD QUALITY CONTROL

- A. General: Repair or remove and replace unacceptable concrete sidewalk, driveways, or curb and gutter as directed by the Owner.
- B. Surface Elevation: Actual surface elevations shall be within ± 0.05 feet of specified or indicated elevations at any given point. Surface elevations between any 2 given points shall be interpolated from a direct line between the 2 points. Surfaces exceeding actual elevation tolerances of more than ± 0.05 feet at any 2 points within a distance of 15-feet will not be acceptable.

END OF SECTION

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**SECTION 02578
SOLID SODDING**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Establishing a stand of grass by furnishing and placing grass sod. Included are fertilizing, watering, and maintenance as required to assure a healthy stand of grass. Solid sodding shall be placed on all slopes greater than 4:1, on all soil within and south of the fenced area and in all areas where existing grass, sod, or other ground cover (regardless of its condition) is removed or disturbed by Contractor's operation unless otherwise specified or shown on the Drawings.

1.02 SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the Owner for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300: Submittals.
 - 1. A certification of sod quality by the producer shall be delivered to the Owner ten days prior to use.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All material supplied shall be as specified in Section 981, FDOT Standard Specifications for Road and Bridge Construction.

2.02 GRASS SOD

- A. Grass sod for the road rights-of-way shall be Argentine Bahia (*Paspalum Notatum*) or St. Augustine to match the existing adjacent area and shall be well matted with grass roots. The sod shall be taken up in rectangles, preferably 12-inch by 24-inch, shall be a minimum of 2-inches in thickness, and shall be live, fresh, and uninjured at the time of planting.
- B. Grass sod for new construction sites and/or areas disturbed by construction on existing sites shall be Argentine Bahia (*Paspalum Notatum*) well matted with grass roots. The sod shall be taken up in rectangles, preferably 12-inch by 24-inch, shall be a minimum of 2-inches in thickness, and shall be live, fresh, and uninjured at the time of planting.
- C. It shall be reasonably free of weeds and other grasses and shall have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. The sod shall be planted as soon as possible after being dug and shall be shaded and kept moist until it is planted.

2.03 FERTILIZER

- A. Commercial fertilizers shall comply with the state fertilizer laws.

- B. The numerical designations for fertilizer indicate the minimum percentages (respectively) of (1) total nitrogen, (2) available phosphoric acid, and (3) water-soluble potash contained in the fertilizer.
- C. The chemical designation of the fertilizer shall be 6-6-6. At least 50% of the nitrogen shall be derived from organic sources. At least 50 % of the phosphoric acid shall be from normal super phosphate or an equivalent source, which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container.

2.04 WATER FOR GRASSING

- A. The water used in the sodding operations shall be by the Contractor as approved by the Owner.

PART 3 - EXECUTION

3.01 PREPARATION OF GROUND

- A. The area over which the sod is to be placed shall be scarified or loosened to a depth and then raked smooth and free from debris. Where the soil is sufficiently loose and clean, the Owner, at its discretion, may authorize the elimination of ground preparation.

3.02 APPLICATION OF FERTILIZER

- A. Before applying fertilizer, the soil pH shall be brought to a range of 6.0 - 7.0.
- B. The fertilizer shall be spread uniformly over the area to be sodded at the rate of 700-pounds per acre, or 16-pounds per 1,000 square feet, by a spreading device capable of uniformly distributing the material at the specified rate. Immediately after spreading, the fertilizer shall be mixed with the soil to a depth of approximately 4-inches.
- C. On steep slopes, where the use of a machine for spreading or mixing is not practicable, the fertilizer shall be spread by hand and raked in and thoroughly mixed with the soil to a depth of approximately 2-inches.

3.03 PLACING SOD

- A. The sod shall be placed on the prepared surface, with edges in close contact and shall be firmly and smoothly embedded by light tamping with appropriate tools.
- B. Where sodding is used in drainage ditches, or on slopes of 4:1 or greater, the setting of the pieces shall be staggered to avoid a continuous seam along the line of flow. Along the edges of such staggered areas, the offsets of individual strips shall not exceed 6-inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.
- C. On slopes greater than 2:1, the Contractor shall, if necessary, prevent the sod from sliding by means of wooden pegs driven through the sod blocks into firm earth at suitable intervals.

- D. Sod which has been cut for more than 72-hours shall not be used unless specifically authorized by the Owner after the inspection thereof. Sod which is not planted within 24-hours after cutting shall be stacked in an approved manner, maintained, and properly moistened. Any pieces of sod that, after placing, show an appearance of extreme dryness shall be removed and replaced by fresh, uninjured pieces.
- E. Sodding shall not be performed when weather and soil conditions are, in the Owner's opinion, unsuitable for proper results.

3.04 WATERING

- A. The areas on which the sod is to be placed shall contain sufficient moisture, as determined by the Owner, for optimum results. After being placed, the sod shall be kept in a moist condition to the full depth of the rooting zone for at least 2-weeks. Thereafter, the Contractor shall apply water as needed until the sod roots and starts to grow for a minimum of 60-days (or until Final Completion, whichever is latest).

3.05 MAINTENANCE

- A. The Contractor shall maintain, at his expense, the sodded areas in a satisfactory condition until Final Completion of the Project. Such maintenance shall include repairing of any damaged areas and replacing areas in which the establishment of the grass stand does not appear to be developing satisfactorily.
- B. Replanting or repair necessary due to the Contractor's negligence, carelessness, or failure to provide routine maintenance shall be at the Contractor's expense.

END OF SECTION

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**SECTION 02660
POTABLE WATER SYSTEM**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Provide a complete system for water transmission/distribution pressure piping and appurtenant items.

1.02 QUALITY ASSURANCE

A. Design Requirements

1. Piping shall be laid with a minimum cover of 36-inches below finished grade for mains sized 12-inch and below and a minimum cover of 48-inches for mains sized 16-inch and greater. Pipe located within Local roadways (subdivisions) or within an easement, shall be laid with a minimum cover of 30-inches.
2. Pipelines shall be constructed of the materials indicated in this specification and on the Drawings.

B. Pipe Inspection:

1. The Contractor shall obtain a certificate of inspection from the pipe manufacturer stating that the pipe and fittings supplied for this Contract have been inspected at the plant and that they meet the requirements of these specifications.
2. The entire product of any plant may be rejected when, in the opinion of the Owner, the methods of manufacture fail to secure uniform results, or where the materials used are such as to produce inferior pipe or fittings.
3. All pipe and fittings shall be subjected to a visual inspection at the time of delivery and before being lowered into the trench. Joints or fittings that do not conform to these specifications will be rejected and must be removed immediately by the Contractor.
4. The Owner reserves the right to sample and test any pipe or fitting after delivery and to reject all pipe and fittings represented by any sample which fails to comply with the specified requirements.

- C. Prevention of electrolysis is required in accordance with AWWA C105 and when crossing, or adjacent to, a power easement, gas easements, any location where induced currents may be present, in areas where aggressive soils exist, and where shown on Drawings. Ductile iron pipe, fittings, valves, and appurtenances shall be Polyethylene wrapped below grade. See Drawings for requirements

1.03 SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the Owner for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300: Submittals.

1. Mill test certificates or certified test reports on pipe
2. Details of restrained and flexible joints
3. Detailed laying schedule for pipe
4. Valves and valve boxes

1.04 JOB CONDITIONS

A. Water in Excavation

1. Dewatering shall be in accordance with. Section 02140: Dewatering. Water shall not be allowed in the trenches while the pipes are being laid and/or tested. The Contractor shall not open more trench than the available pumping facilities are able to dewater to the satisfaction of the Owner. The Contractor shall assume responsibility for disposing of all water so as not to injure or interfere with the normal drainage of the territory in which he is working.
2. In no case shall the pipelines being installed be used as drains. The ends of the pipe shall be kept properly and adequately blocked during construction by the use of approved stoppers and not by improvised equipment.
3. All necessary precautions shall be taken to prevent the entrance of mud, sand, or other obstructing matter into the pipelines. If on completion of the Work any such material has entered the pipelines, it must be cleaned as directed by the Owner so that the entire system will be left clean and unobstructed.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 MATERIALS

- A. Pipe, Fittings, Valves, and Ancillary Equipment shall be installed as shown on the Drawings and as specified in Division 15.
- B. Fire Hydrants and Valve Assemblies:
 1. Fire hydrants shall be 5-1/4 inch minimum valve opening and shall comply with the current AWWA Standard Specifications C502. Fire hydrants shall be of ample length for 3 foot depth of bury with necessary extensions to place safety flange the required 5 inches above finished grade. Each hydrant shall be made in at least two (2) sections bolted together. All interior working parts of the hydrant shall be removable from the top of the hydrant to allow repairs without removing the hydrant barrel after it has been installed. It shall be provided with two (2) 2-1/2 inch hose nozzles and one (1) 4-1/2 inch pumper nozzle, all having its specific Fire District Standard hose threads. All nozzles shall have caps attached by chains. Operating nuts shall be AWWA Standard. Fire hydrants shall be manufactured without drain holes, or the manufacturer shall permanently plug drain or weep holes. Three (3)-operating wrenches shall be furnished for every ten (10) hydrants installed or relocated.

2. All hydrant assemblies shall incorporate anchoring hydrant fittings, including M.J. Locked Hydrant Tee with split gland to provide the locking together of the entire assembly. Gate valve shall be as specified in Section 15111.
 3. All hydrants shall have a 40-inch to 90-inch square by 6-inch thick reinforced concrete shear pad as shown in the Drawings.
 4. Fire hydrants shall be located in the general location as shown on the Drawings. Final field location of all hydrants shall be as directed by the Owner. All hydrants shall be located no less than five (5) and no more than ten (10) feet from the edge of pavement of the adjacent roadway and no less than five (5) feet from any physical feature which may obstruct access or view of any hydrant unless otherwise directed by the Owner.
 5. All non-brass parts of the hydrant, both inside and out, shall be painted in accordance with AWWA C502. The shoe of the hydrant below the ground line shall have a fusion bonded epoxy coating and the barrel of the hydrant below ground shall be coated with a mastic material by the manufacturer.
- C. Additional Work: Additional items of construction, necessary for the complete installation of the systems, shall conform to specific details shown on the Drawings and shall be constructed of first-class materials conforming to the applicable portions of these specifications.

PART 3 - EXECUTION

3.01 PREPARATION

A. Bedding:

1. Pipe Cradle: Upon satisfactory installation of the pipe bedding material as specified in Section 02220: Excavating, Backfilling and Compacting, a continuous trough for the pipe barrel and recesses for the pipe bells or couplings shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure will be exerted on the pipe joints from the trench bottom.
2. Cleanliness: The interior of the pipes shall be thoroughly cleaned of all foreign matter before being gently lowered into the trench and shall be kept clean during laying operations by means of plugs or other methods approved by the Owner. During suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

3.02 INSTALLATION

A. Pipe Identification/Location

1. All PVC water mains (smaller than 4") shall be solid blue. All lettering shall appear legibly on the pipe and shall run the entire length of the pipe. Lettering shall read as is acceptable for the intended use.

2. All ductile iron water mains shall be encased in color-coded blue polyethylene tubing meeting the requirements of AWWA C105/ANSI A21.5.
 3. Lifting of the water main shall be accomplished via a fabric-type sling or suitably padded cable so as to prevent damage to the polyethylene and water main.
 4. All mains shall be installed with a continuous, color-coded insulated 10-gauge copper wire installed directly above the pipe for location purposes. Locate wire shall terminate in a test station box and be capable of extending 12-inches above the top of the box. Directionally drilled pipe shall be installed with 2 insulated 10-gauge copper wires.
- B. Pipe: Three color stripes shall be located on the pipe, one on top and one each on the sides parallel to the axis of the pipe when installed. The pipe text shall be located on the top of the pipe. When installing PVC pipe, no additional joints will be installed until the preceding pipe joint has been completed and the pipe carefully embedded and secured in place.
1. Gradient: Pipe shall be laid straight and depth of cover shall vary to provide uniform gradient or slope to pipe, whether grading is completed or proposed at time of pipe installation. When a grade or slope is shown on the Drawings, batter boards with string line paralleling design grade, or other previously approved means, shall be used by the Contractor to assure conformance to required grade.
 2. Pipe Joint Deflection
 - a. Ductile Iron Pipe: Whenever it is desirable to deflect pipe, the amount of deflection shall not exceed 75% of the maximum limits as shown in AWWA Standard C600 for ductile iron pipe.
 - b. PVC Pipe: Joint deflection or pipe bending shall not be permitted. The maximum allowable tolerance in the joint due to variances in installation is 0.75° (degrees) (3-inches per joint per 20-foot stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment change shall be made only with sleeves and fittings.
 3. Rejects: Any pipe found defective shall be immediately removed and replaced with sound pipe at the Contractor's expense.
 4. Joint Compounds: No sulfur base joint compound shall be used.
 5. Thrust restraints shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein. Restraining devices shall be specified in Section 15062: Ductile Iron Pipe.
- C. Installing Valves and Boxes
1. Valves: Valves shall be carefully inspected, fully opened, and then tightly closed and the various nuts and bolts shall be tested for tightness. Any valve that does not operate correctly shall be removed and replaced.
 2. Valve Boxes: Valve boxes shall be carefully centered over the operating nuts of the valves so as to permit a valve key to be fitted easily to the operating nut. In unpaved areas, valve boxes shall be set to conform to the level of the

finished surface and held in position by a concrete collar placed under the support flange as shown on the Drawings. The letter "V" shall be etched in the curb at each valve location. The valve box shall not transmit surface loads to the pipe or valve but be supported by bedding rock as shown on the Drawings. Extensions or risers for valve boxes shall be an integral part of the box. No cut sections of D.I. or PVC pipe shall be used in extending the box to its proper height. Care shall be taken to prevent earth and other material from entering the valve box. Any valve box which is out of alignment or whose top does not conform to the finished ground surface shall be dug out and reset. Before final acceptance of the Work all valve boxes shall be adjusted to finish grade.

3. Concrete Collar: Each valve installed in an unimproved area (outside of pavement, driveways or sidewalks) shall require a 24-inch by 24-inch by 6-inch concrete pad or collar as shown in the Drawings.
4. Identification Disc: Each 16-inch or larger valve (unless otherwise shown on the Drawings) installed shall be identified by a 3-inch diameter bronze disc anchored in the concrete pad or collar in unimproved areas and/or anchored on a 4-inch by 4-inch by 18-inch long concrete post set flush with the pavement surface in improved areas. The disc shall be stamped with the following information as shown on the Drawings:
 - a. Size of the valve
 - b. Type of valve
 - c. Service
 - d. Direction and number of turns to open

D. Concrete Encasement

1. Concrete encasement shall be constructed in accordance with details shown on the Drawings and shall be constructed of Class C concrete. Encasement shall be constructed where;
 - a. Indicated on the Drawings
 - b. The Owner orders the pipe encased
2. The points of beginning and ending of pipe encasement shall be not more than 6-inches from a pipe joint to protect the pipe from cracking due to uneven settlement of its foundation or the effects of superimposed live loads.

E. Flush Out Connections: Flush out connections shall be installed at the locations as determined by the Owner and be full pipe size.

F. Service Connections: Service connections shall be installed at the locations determined by the Owner and in the manner shown on the Drawings. No service line shall terminate under a driveway.

G. Backfilling: Backfilling shall be in accordance with Section 02220: Excavating, Backfilling and Compacting of these specifications.

3.03 CLEANING

- A. General: At the conclusion of the Work, the Contractor shall thoroughly clean the new pipelines by flushing with water or other means to remove all dirt, stones, or other material which may have entered the line during the construction period. Flushing is permitted for pipes less than or equal to 12-inch diameter.
- B. Correction of Non-Conforming Work: All non-conforming work shall be repaired or replaced by the Contractor at no additional expense to the Owner. Non-conforming work shall be defined as failure to adhere to any specific or implied directive of this Project Manual and/or the Drawings, including but not limited to pipe not laid straight, true to the lines and grades as shown on the Drawings, damaged or unacceptable materials, misalignment or diameter ring deflection in pipe due to bedding or backfilling, visible or detectable leakage, or failure to pass any specified test or inspection.

3.04 FIELD QUALITY CONTROL

A. Flushing

- 1. All pipelines less than or equal to 12-inches shall be flushed to remove all sand and other foreign matter. After initial slow-fill, pipe shall sit full for 24-hours to facilitate cleaning and collection of debris from interior of pipe. Flushing shall be accomplished through full pipe size connections at full pipe depth. The velocity of the flushing water shall be at least 2.5-feet per second. Flushing shall be terminated at the direction of the Owner. The Contractor shall dispose of the flushing water without causing a nuisance or property damage. The Contractor shall arrange with the Owner and pay for the source of flushing water.
- 2. In addition to flushing, hydraulically clean the potable water transmission main with a polypropylene swabbing device in accordance with "Orange County Utilities Standards and Construction Specifications Manual."
 - a. The Contractor is responsible to provide temporary access and egress points.
 - b. Passage of the cleaning swabs through the system shall be constantly monitored, controlled, and all poly swabs entered into the system shall be individually marked and identified.
 - c. Cleaning of the system shall be done in conjunction with the initial filling of the system for its hydrostatic test.
 - d. The Contractor is responsible for collection of debris, water, and the swab. Considerations shall be made for protecting surrounding property and personnel.
 - e. Swabbing speed shall range between 2 and 5-feet per second.

B. Pressure and Leakage Tests of Pressure Piping

- 1. General: The Contractor shall perform hydrostatic pressure and leakage tests on all pressure piping. Tests shall be made between valves and shall not exceed 2,000-feet. Each side of all valves shall be pressure tested. Multiple sections of main may be tested simultaneously providing there are non-pressurized sections in between each pressure-tested section.

2. Standard: AWWA C600, Section 4, with the exceptions required herein and the exception that the Contractor shall furnish all gauges, meters, pressure pumps, and other equipment needed to test the lines.
3. Hydrostatic Pressure Test
 - a. Test Pressure: Pressure test at 50% above the normal working pressure, but not less than 150-psi, unless otherwise noted on the Drawings.
 - b. Test Duration: Duration is 2-hours. If during the test, the integrity of the tested line is in question, the County may require a 6-hour pressure test.
 - c. Air Release: Corporation cocks at least 3/4-inch in diameter, pipe riser, and angle globe valves shall be provided at each dead-end to bleed air from the line.

4. Hydrostatic Leakage Test

- a. General: Following the pressure test, the Contractor shall perform the leakage test. The line shall be filled with water and all air removed for the test. The Contractor shall provide a pump to maintain the test pressure for the entire test period.
- b. Test Pressure: Maximum operating pressure as determined by the Owner but not less than 150-psi unless otherwise noted.
- c. Test duration: 2-hours.
- d. Allowable leakage:

$$L = \frac{SD(P)^{0.5}}{148,000}$$

L = Allowable leakage (gallons per hour)

S = Length of pipe tested (feet)

D = Nominal diameter of pipe (inches)

P = Average test pressure maintained (psig)

- e. Visible Leakage: All leaks evident at the surface shall be repaired and leakage eliminated regardless of the measured total leakage.
- f. Leakage Measurement: The amount of water required to maintain the test pressure is the leakage.

- C. Wire Continuity Check: The Contractor shall perform a continuity check of the 10-gauge locating wire for the entire length of the main by performing a continuity test at each valve test station box.

3.05 DISINFECTING POTABLE WATER PIPELINES

- A. General: Before being placed in service, all potable water pipelines shall be disinfected by chlorination. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required. The disinfection procedure shall be approved by the Owner.
- B. Standard: AWWA 651, "Standard Procedures for Disinfecting Water Mains."
- C. Procedure

1. Submit Disinfection Plan to the Owner and must be approved at least 7 days prior to disinfection taking place.
 2. Flush all dirty or discolored water from the line and introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line.
 3. The chlorine solution shall remain in the pipeline for 24-hours.
 4. Following the chlorination period, all treated water shall be flushed from the line and replaced with water from the distribution system.
 5. Pipelines disinfection requires two consecutive days of passing samples.
 6. Bacteriological sampling and analysis shall be made in full accordance with AWWA Manual C651 and the appropriate FDEP permit. If necessary, the Contractor will be required to re-chlorinate.
 7. Sampling and analysis shall be done by the Owner.
- D. Approval: The line shall not be placed in service until the requirements of the State and County Public Health Department are met and the bacteriological test results are approved by the Department of Environmental Protection (FDEP). No pipelines can be put into operation until official clearance letter from FDEP is received.

3.06 DISINFECTING POTABLE WATER TANK

- A. General: Before being placed in service, potable water tank shall be disinfected by chlorination. The disinfection procedure shall be approved by the Owner.
- B. Standard: AWWA 651, "Standard Procedures for Disinfecting Water Mains."
- C. Procedure
 1. Submit Disinfection Plan to the Owner and must be approved at least 7 days prior to disinfection taking place.
 2. Flush all dirty or discolored water from the tank and introduce chlorine in approved dosages.
 3. The chlorine solution shall remain in the tank for 24-hours.
 4. Following the chlorination period, all treated water shall be flushed from the tank and replaced with water from the distribution system.
 5. Tank disinfection requires two consecutive days of passing samples.
 6. Bacteriological sampling and analysis shall be made in full accordance with AWWA Manual C651 and the appropriate FDEP permit. If necessary, the Contractor will be required to re-chlorinate.
 7. Sampling and analysis shall be done by the Owner.
- D. Approval: The line shall not be placed in service until the requirements of the State and County Public Health Department are met and the bacteriological test results are approved by the Department of Environmental Protection (FDEP). No tank can be put into operation until official clearance letter from FDEP is received.

3.07 CONNECTION TO EXISTING SYSTEM

- A. All connections to existing mains shall be made after complete disinfection of the proposed system and shall be made under the direction of the County. Valves separating the mains being installed from existing mains shall be operated by or under the direction of the County. The cost of the Work in making the connections shall be paid for by the Contractor.
- B. In the event the proposed main is to be connected to a main which has one or more active services between the point of connection and the first existing line valve, a temporary plug or cap shall be installed on the new main until the pressure tests and disinfecting are completed. Upon satisfactory completion, the cap or plug shall be removed from both mains and the connection made with pipe which has been swabbed out with a solution of chlorine and water. The connection shall be made as swiftly as possible and any water in the ditch shall be kept below the level of the pipe. The pipeline shall then be placed in service by the Owner's personnel.
- C. In the event any existing users will be without water while a connection is being made, the Contractor shall notify the Owner 72-hours prior to disconnection. The Owner shall notify the affected user(s) when the water will be turned off and when the service is estimated to be resumed. In some instances, these connections may have to be made at night. No user shall be without water service for more than 3-hours.

3.08 SUPPLIER'S FIELD SERVICE:

- A. The Contractor shall, at no additional cost to the Owner, arrange for a pipe supplier's field representative to be on-site to provide instruction to each crew working on the installation for a minimum of 4 push-on joints (PVC, DIP). The supplier's field representative shall certify that the installations observed were satisfactorily completed and all pipe installation crews were familiar with the proper methods and procedures for the pipeline installations.

3.09 WATER FOR USE IN FLUSHING, TESTING, AND DISINFECTION:

- A. The Contractor shall arrange with the Owner for water required for pressure testing, flushing, and disinfection required by the Contractor. The Contractor shall provide meter and backflow preventer.

END OF SECTION

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SECTION 03600 GROUTING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The scope of work involves the grouting of the space left void in the abandonment of the existing pipelines and structures and service lines to be abandoned by grout filling as shown on the Drawings. The work consists of furnishing all labor, equipment and materials and performing all work connected with the placement of the cementitious grout to fill the void(s).

1.02 QUALITY ASSURANCE

- A. Grouting shall be performed by a crew under the direct supervision of a superintendent that has experience in grouting of this nature.
- B. Storage, mixing, handling and placement shall be in accordance with manufacturer's instructions and specifications.

1.03 SUBMITTALS

- A. Shop Drawings: Shop drawings shall be submitted in accordance with the General Conditions and Section 01001 - General Requirements of these specifications. In addition, the following shall be submitted to the Engineer for review and acceptance prior to construction.
 - 1. A detailed description of equipment and operational procedures to accomplish the grouting operation, including grout mixture design, grout mixer type, grout samples, and test data.
 - 2. A detailed description of the grouting time schedule.

PART 2 - PRODUCTS

2.01 GROUT MATERIAL

- A. The grout shall be a "flowable fill" consisting of a mixture of Type 1 Portland Cement, Type "F" Flyash (ASTM 618), sand and water.
- B. The mixture shall contain a minimum of 50 pounds cement and minimum of 400 pounds flyash per cubic yard of grout.

2.02 EQUIPMENT

- A. All grout shall be mixed with a high shear, high energy colloidal type mixer to achieve the best uniform density.
- B. The grout shall be pumped with a non-pulsating centrifugal or tri-plex pump.
- C. The mixer shall be capable of continuous mixing. Batch mixing shall not be permitted.

PART 3 - EXECUTION

3.01 GROUTING

- A. Grouting of the annular space due to the abandonment of the existing piping as shown on the Drawings will be allowed in continuous individually bulkheaded segments of up to 300 linear feet.
- B. Grout shall be placed in a maximum of three stages, with the initial stage volume equal to or greater than 50% of the total volume for that section of pipe being grouted. The maximum time wait between grouting stages shall be 24 hours.
- C. For each stage, mix and pump the material in one continuous process so as to avoid partial setting of some grout material during that stage, thus, eliminating voids and possible subsequent surface damage due to "cave-ins".
- D. Each section shall be grouted by injecting grout from the lowest point and allowing it to flow toward the highest point to displace water from the annulus and assure complete void-free coverage. Grout shall be placed through tubes installed in the bulkheads at the insertion pits or manholes. Grout tubes shall be at least 2-inch nominal diameter.
- E. After the ends of each section of pipe are exposed, the entire space, not to exceed 300 linear feet end to end, shall be sealed by controlled pumping of grout until it flows from the pipe at the opposite end of the grouting. **Grouting shall be carried out until the entire space is filled.**
- F. Grout pressure in the void space is not to exceed five (5) psi above maximum hydrostatic groundwater level. An open ended, highpoint tap or equivalent vent must be provided and monitored at the bulkhead opposite to the bulkhead through which grout is injected. This bulkhead will be blocked closed as grout escapes to allow the pressuring of the annular space.

3.02 FIELD QUALITY CONTROL

- A. The quality of the grout, application of the equipment, and installation techniques are the responsibility of the Contractor. The review and acceptance or approval of specific mix design, equipment or installation procedures shall in no way relieve the Contractor of his obligation to provide the final product as specified herein and as used to properly abandon the piping in place.

END OF SECTION

SECTION 15062
DUCTILE IRON PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Furnish all labor, materials, equipment and incidentals required and install, all ductile iron piping, ductile iron fittings, and appurtenances as shown on the Drawings and as specified herein.
- B. General Design: The equipment and materials specified herein are intended to be standard types of ductile iron pipe and cast or ductile iron fittings for use in transporting wastewater, potable water, and reclaimed water.

1.02 QUALITY ASSURANCE

- A. Qualifications: All of the ductile iron pipe and ductile or cast iron fittings shall be furnished by manufacturers who are fully experienced, reputable, and qualified in the manufacture of the materials to be furnished. The pipe and fittings shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.
- B. Standards:
 - 1. ANSI A 21.50/AWWA C150
 - 2. ANSI A-21.51/AWWA C151
 - 3. ANSI A-21.41/AWWA C104
- C. Factory Tests: The manufacturer shall perform the factory tests described in ANSI A-21.51/AWWA C151.
- D. Quality Control
 - 1. The manufacturer shall establish the necessary quality control and inspection practice to ensure compliance with the referenced standards. All pipe on this Project shall be supplied by a single manufacturer unless otherwise accepted in writing by the County.
 - 2. In addition to the manufacturer's quality control procedures, the County may select an independent testing laboratory to inspect the material at the foundry for compliance with these specifications. The cost of foundry inspection requested by the County will be paid for by the County.

1.03 SUBMITTALS

- A. Materials and Shop Drawings
 - 1. Submit Shop Drawings and piping layouts, including areas within and under buildings and structures. Shop Drawings shall include dimensioning, methods and locations of supports and all other pertinent technical specifications. Show locations of all field cuts. Shop Drawings shall be prepared by the pipe

manufacturer. Shop Drawings for piping within and under buildings and structures shall be submitted within 30-days of Execution of Contract.

- B. Operating Instructions: Submit Operation and Maintenance Manuals in accordance with Section 01001 "General Work Requirements."
- C. Manufacturer's Certification
 - 1. Submit manufacturer's sworn certification of factory tests and test results.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

The Contractor shall be responsible for all materials furnished and stored until the date of project completion. The Contractor shall replace, at his expense, all materials found to be defective or damaged in handling or storage. The Contractor shall, if requested by the County, furnish certificates, affidavits of compliance, test reports, samples or check analysis for any of the materials specified herein. All pipe delivered to project site for installation is subject to random testing for compliance with the designated specifications.

- A. Delivery and Storage: Delivery and storage of the materials shall be in accordance with the manufacturer's recommendations. Stored pipe shall be covered for protection against contamination and UV light. Joint gaskets shall be stored in clean, dark and dry location until immediately before use.
- B. Handling: Care shall be taken in loading, transporting and unloading to prevent damage to the pipe and fittings and their respective coatings. Pipe or fittings shall not be rolled off the carrier or dropped. Pipe shall be unloaded by lifting with a forklift or crane. All pipe or fittings shall be examined before installation and no piece shall be installed which is found to be defective. Pipe shall be handled to prevent damage to the pipe or coating. Accidental damage to pipe or coating shall be repaired to the satisfaction of the County or be removed from the job. When not being handled, the pipe shall be supported on timber cradles or on level ground, graded to eliminate all rock points and to provide uniform support along the full pipe length. When being transported, the pipe shall be supported at all times in a manner which will not permit distortion or damage to the lining or coating. Any unit of pipe that, in the opinion of the County, is damaged beyond repair by the Contractor shall be removed from the site.

PART 2 - PRODUCTS

2.01 MATERIALS

- A. Ductile Iron Pipe
 - 1. Standards: ANSI A-21.50, AWWA C150 and ANSI A-21.51, AWWA C151
 - 2. Thickness/Pressure Class:
 - a. Below ground piping: Class 350 (4-inch to 12-inch), Class 250 (16-inch to 24-inch) and Class 200 (30-inch to 64-inch) unless otherwise noted or specified.
 - b. Above ground piping: Flanged, Class 350 (minimum) unless otherwise noted or specified.

3. Joints

a. Push-on or Mechanical Joints (below ground piping)

- i. Standards: ANSI A21.11, AWWA C111
- ii. Class: 350-psi working pressure rating
- iii. Gaskets

I. Potable and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) ring type.

II. Wastewater Service: Neoprene rubber ring type.

b. Flanged (above ground or inside below ground vaults)

- i. Standards: ANSI A21.15, ANSI B16.1
- ii. Class: 125-pound factory applied screwed long hub flanges, plain faced without projection.
- iii. Gaskets

I. Spans less than 10-feet: full-face 1/8-inch thick neoprene rubber

II. Spans greater than 10-feet: Toruseal gaskets as manufactured by American Cast Iron Pipe or acceptable equal.

c. Restrained Joints

- i. Manufacturers: Lok-Ring system (all sizes) or locking type gasket systems (for 16-inch diameter and smaller) as manufactured by American Ductile Iron Pipe; MEGALUG System as manufactured by EBBA Iron; or acceptable equal.
- ii. Class: 250-psi minimum design pressure rating.
- iii. Standard mechanical joint retainer glands shall not be acceptable.

d. Joint Accessories

- i. Mechanical joint bolts, washers and nuts: Ductile iron or Corten steel.
- ii. Flanged joint bolts, washers and nuts: 316 stainless steel with bolts and nuts conforming to ASTM A193 Grade B8M.

e. Pipe Length (below ground installation): 20-foot maximum nominal length.

4. Pipe Identification

- a. 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 markings shall be plainly visible on the pipe barrel. Pipe which 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. Fittings

1. Ductile iron fittings 4-inch through 24-inch shall be pressure rated at 350-psi minimum, except flanged joint type fittings which shall be rated at 250-psi minimum. All 30-inch and larger fittings shall be pressure rated to 250-psi minimum. All fittings shall conform to either ANSI/AWWA C110/A21.10 and/or C153/A21.53, latest revision, and shall be ductile iron only. All fittings shall be cast and machined allowing the bolt holes to straddle the vertical centerline. All fittings shall be designed to be capable to withstand, without bursting, hydrostatic tests of three times the rated water working pressure. All fittings shall have a date code cast (not printed or labeled) with identification of date, factory, and the factory unit from which it was cast and machined. Fittings shall have the pressure rating, nominal diameter of openings, manufacturer's name, and the country where cast and number of degrees or fraction of the circle distinctly cast on them. Ductile iron fittings shall have the letter "DI" or "Ductile" cast on them.
2. Joints shall be as described for ductile iron pipe for above ground/exposed and buried service.
3. All potable water main fittings shall have NSF 61 certification, and ISO 9001 certification for both the foundry and manufacturer. The NSF 61 certification shall be issued on all coatings and linings, from the said manufacturers that are used for potable water applications.

2.02 COATINGS, LININGS AND IDENTIFICATION MARKINGS

A. Exterior Coatings

1. Below ground/buried or in a casing pipe:
 - a. Type: Asphaltic coating, 1.0-mil DFT in accordance with ANSI/AWWA A21.51/C151.
 - b. Markings: (continuous 3-inch wide strip within top 90 degrees of pipe - min. drying time 30-minutes before backfill).
 - c. Color:
 - i. Raw Wastewater: Safety Green
 - ii. Reclaimed Water: Purple (Pantone 522C)
 - iii. Potable Water: Safety Blue
2. Above ground/Exposed/In vaults
 - a. Coatings and coating testing for ductile iron pipe and fittings for above ground/exposed applications shall be accordance with Division 9. Primer, intermediate and final coats whether shop or field applied shall be compatible and applied in accordance with the coating system manufacturer's recommendations. Refer to Appendix D "List of Approved Products" for approved coating system suppliers. Asphaltic seal coat applied to the exterior of above ground piping and fittings shall be blasted and completely removed prior to coating per NACE-3/SSPC-SP6 commercial blast cleaning minimum angular anchor profile of 1.5-mils.
 - b. Color

- i. Raw Wastewater: Safety Green
 - ii. Reclaimed Water: Purple (Pantone 522C)
 - iii. Potable Water: Safety Blue
 - 3. Inside Wetwell
 - a. All piping inside of wastewater wetwell shall be 316 stainless steel.
- B. Interior Lining (Applied by pipe manufacturer)
 - 1. Wastewater: Interior coating shall be Protecto 401 (amine cured novalac epoxy containing at least 20% by volume of ceramic quartz pigment) for all pipe and fittings. All ductile iron pipe and fittings shall be delivered to the manufacturer certified applicator without asphalt, cement lining, or any other lining on the interior surface and no coating shall have been applied to the first 6-inches of the exterior of the DIP spigot ends. Minimum surface preparation shall be SSPC-SP 1 Solvent Cleaning method to remove oil and grease followed by NACE-4 / SSPC-SP7 Brush-Off Blast Cleaning. Protecto 401 shall be applied within 12-hours of surface preparation to the interior of the pipe and fittings so as to obtain a continuous and relatively uniform and smooth integral lining with a total minimum dry film thickness of 40-mils for the complete system. No lining shall take place when the substrate or ambient temperature is below 40°F. The lining shall not be used on the face of the flange of fittings or flanged pipe. The system shall be holiday free and holiday testing (minimum 2000 volts) shall be conducted and pinholes shall be repaired prior to shipping.
 - 2. Potable Water and Reclaimed Water: Interior coating shall be fusion-bonded epoxy (FBE) or Cement Mortar lined with asphaltic seal coat.
 - a. FBE for Fittings: Fittings shall be supplied with a FBE coating, both inside and outside for total protection including flanged and buried fittings. The exterior of flanged fittings for above ground assemblies shall adhere to final exterior coating requirements per 3119 2.04 A. The FBE coating system shall meet or exceed ANSI/AWWA C-550 and C116/A21.16 requirements and shall have NSF 61 certification. FBE coating thickness shall be 6 to 8-mils dry film thickness, shall be applied for secure adhesion, shall have a smooth surface and shall be holiday free.
 - b. Cement mortar lining with a seal coat of asphaltic material shall be in accordance with ANSI/AWWA A21.4/C104.

2.03 LOCATION MARKERS AND LOCATION WIRE

- A. Electronic Markers and Locator System (for reclaimed water and wastewater ONLY)
 - 1. Markers: Markers shall consist of a passive device capable of reflecting a specifically designated repulse frequency tuned to the utility (service) being installed. Markers shall be color coded in accordance with American Public Works Association's "Utility Locating and Coordinating Council Standards." Colors shall be: Wastewater and Reclaimed Water - #1404 Green. Markers shall be full range. Markers shall be installed directly above the centerline of the respective pipeline at intervals not to exceed 100-feet, at each fitting (tees,

wyes, crosses, reducers, plugs, caps and bends) or change in horizontal direction and at each valve along the pipeline. Markers shall be hand backfilled to 1-foot above the pad and have a finished depth of burial of not less than 2-feet or more than 6-feet. No separate payment shall be made for furnishing and installing the respective frequency and color-coded electronic pad type marker.

2. Locator System: Marker locator set shall be the Scotch Mark EM II Electronic Marker Locator Path Tracing Receiver, or acceptable equal. The Contractor shall furnish 1-locator set for each type of service piping installed on the project (i.e.: reclaimed water, wastewater) to the County. Each unit shall incorporate the following features and accessories:
 - a. Unit(s) shall be tuned to the proper frequency for each type (service) of piping.
 - b. Field strength meter that provides visual indication of the return signal.
 - c. Function switch for selection of operation mode.
 - d. Sensitivity control to adjust the receiver gain.
 - e. Audio speaker for signal response.
 - f. Battery access panel containing condensed operating instructions.
 - g. Auxiliary headset and heads set jack.
 - h. Permanently attached shoulder straps.
 - i. Rugged shockproof and weatherproof storage/carrying case.
3. Manufacturer: System shall be Scotch Mark Locator System, or acceptable equal.

B. Location Detection Wire

1. Materials: Continuous, insulated 10-gauge copper wire (color to match pipe identification).
2. Installation: Directly above (1-inch maximum) centerline of pipe terminating at top of each valve box collar and be capable of extending 12-inches above top of box (stored inside the 2-inch brass pipe through the valve box collar) in a manner so as not to interfere with valve operation. For direction drilling installations, a minimum of 2 (two) 10-gauge wires shall be pulled along with the pipe.
3. Continuity: Continuity of wire to be tested using Metrotech 810/9860 or acceptable equal.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Ductile iron pipes shall be installed in accordance with AWWA C600 and AWWA Manual M-42. When a restraining type gasket is used, the bell shall be painted red.
- B. Underground Ductile Iron Pipe and Fittings.
 1. Bedding firm, dry and even bearing of suitable material. Blocking under the pipe will not be permitted.
 2. Placement

- a. Alignment: In accordance with lines and grades shown on the Drawings. Deflection of joints shall not exceed 75% of the values recommended by the pipe manufacturer.
 - b. The Contractor shall provide line and grade stakes at a 100-foot maximum spacing and at all line and/or grade change locations. The Contractor shall provide temporary benchmarks at a maximum of 1,000-foot intervals. The minimum pipe cover shall be 30-inches below the finished grade surface or 30-inches below the elevation of the edge of pavement of the road surface whichever is greater.
 - c. All pipe and fittings shall be inspected prior to lowering into trench to insure no cracked, broken or otherwise defective materials are being used. All homing marks shall be checked for the proper length so as to not allow a separation or over homing of connected pipe. Homing marks incorrectly marked greater than 1-inch shall result in rejection of pipe and removal from site. The Contractor shall clean ends of pipe thoroughly and remove foreign matter and dirt from inside of pipe and keep clean during and after installation.
 - d. Proper implements, tools and facilities shall be used for the safe and proper protection of the Work. Pipe shall be lowered into the trench in such a manner as to avoid any physical damage to the pipe. Pipe shall not be dropped or dumped into trenches under any circumstances.
 - e. Trench Dewatering and Drainage Control: Contractor shall prevent water from entering trench during excavation and pipe-laying operations to the extent required to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.
 - f. Pipe Laying in Trench: Dirt or other foreign material shall be prevented from entering the pipe or pipe joint during handling or laying operations and any pipe or fitting that has been installed with dirt or foreign material in it shall be removed, cleaned and re-laid. Pigging of pipe may be used to remove foreign materials in lieu of flushing. At times when pipe installation is not in progress, the open ends of the pipe shall be closed by a watertight plug or by other means approved by the County to ensure absolute cleanliness inside the pipe. The pipe shall be installed with the color stripe and pipe text on the top of pipe.
3. Cutting: When required, cutting shall be done by machine, leaving a smooth cut at right angles to the axis of the pipe. Cut ends of the pipe to be used with a push-on bell shall be beveled. Bare metal exposed at ends of the pipe shall be field coated in accordance with pipe manufacturer's recommendations. Cut pipe for wastewater service shall have exposed bare metal ends repaired with Protecto 401 using the coating system manufacturer's field repair kit.
4. Joints
- a. Joint Placement
 - i. Push on joints: Pipe shall be laid with the bell facing upstream. The gasket shall be inserted and the joint surfaces cleaned and

lubricated prior to placement of the pipe. After joining the pipe, a metal feeler shall be used to verify that the gasket is correctly located.

- ii. Mechanical Joints: Pipe and fittings shall be installed in accordance with the "Notes on Method of Installation" under ANSI A21.11/AWWA C111. The gasket shall be inserted and the joint surfaces cleaned and lubricated with soapy water before tightening the bolts to the specified torque.

C. Thrust Restraint

- 1. General: Thrust restraint shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein.
- 2. Length of Restrained Joints: All pipe joints for all water, reclaimed water and force main pipes shall be restrained.

D. Installation of Pipes on Curves

- 1. Maximum deflections at pipe joints, fittings and laying radius for the various pipe lengths shall not exceed 75% (percent) of the pipe manufacturer's recommendation.

- E. Polyethylene encasement: See paragraph 2.02C. Installation shall be in accordance with pipe manufacturer's instructions.

3.02 CLEANING AND FIELD TESTING

- A. General: At the conclusion of the Work, the Contractor shall provide all associated cleaning and field testing as specified in other related sections of these specifications.

END OF SECTION

**SECTION 15100
ANCILLARY EQUIPMENT**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Provide all valves and appurtenances, ready for operation, as shown on the Drawings and as specified herein.

1.02 QUALITY ASSURANCE

- A. All valves, appurtenances, and ancillary equipment shall be products of well-established reputable firms who are fully experienced, reputable and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these Specifications.

1.03 SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the County for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."

PART 2 - PRODUCTS

2.01 GENERAL

- A. All valves, appurtenances, and ancillary equipment shall be of the sizes shown on the Drawings and specified herein.
- B. All valves and appurtenances shall have the name of the maker and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.
- C. All valves, appurtenances, and ancillary equipment shall be as specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 AIR RELEASE VALVES

- A. For Water Service and Reclaimed Water Service
 1. General: Water mains shall be equipped with combination air release valves located as shown on the Drawings. Valves shall be made to remove air at high points where elevation changes exceed 5-feet. Automatic air release valves shall be located at high points for pipe systems greater than 12-inches in diameter.
 2. Water and Reclaimed Water Combination Air Release Valves: The valve body shall be 316 stainless steel, 316 stainless steel float, bronze water diffuser Buna-N or Viton seat and stainless steel trim.
 3. Fittings from the main to the air release valve shall be threaded and made of brass.

- B. Air release valves shall be installed in an enclosure.

2.03 TAPPING SLEEVES AND VALVES

- A. General: Tapping sleeves shall be mechanical joint sleeves.
- B. Mechanical Joint Sleeves: Sleeves shall be cast of gray-iron or ductile-iron and have an outlet flange with the dimensions of the Class 125 flanges shown in ANSI B16.1 and properly recessed for tapping valve. Glands shall be gray-iron or ductile iron. Gaskets shall be vulcanized natural or synthetic rubber. Bolts and nuts shall comply with ANSI/AWWA C111/ANSI A21.11. Sleeves shall be capable of withstanding a 200-psi working pressure.
- C. Fabricated Mechanical Joint Tapping Sleeves: Sleeves shall be of split mechanical joint design with separate end and side gaskets. Sleeves shall be fabricated of high strength steel, meeting ASTM A283 Grade C or ASTM A-36. Outlet flange shall meet AWWA C-207, Class "D" ANSI 150-pound drilling and be properly recessed for the tapping valve. Bolts and nuts shall be high strength low alloy steel to AWWA C111 (ANSI A21.11). Gasket shall be vulcanized natural or synthetic rubber. Sleeve shall have manufacturer applied fusion-bonded epoxy coating, minimum 12-mil thickness.
- D. Tapping Valves: Tapping valves shall be resilient seated gate valves flange by mechanical joint ends. Valves shall be compatible with tapping sleeves as specified above and specifically designed for pressure connection operations.
 - 1. Tapping valves with alignment lip shall be placed vertical where possible for Water and Reclaimed Water.
 - 2. Tapping Valves 16-inch and larger shall be AWWA C515 resilient seated only (16-inch and 24-inch no gearing required) above 24-inch shall be installed vertically with a side spur gear actuator. When tapping existing mains, valves 24-inch and above shall be furnished with NPT pipe plugs for flushing the tracks.

2.04 VALVE BOXES FOR BURIED VALVES

- A. Standard 2-piece Cast Iron Valve Box: Required for mains less than 6-feet below finished grade and less than or equal to 12-inches in diameter.
 - 1. 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 the County's Representative.
 - 2. The barrel shall be 2-piece, 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 locking cast iron covers. Coat buried cast iron pieces with coal tar epoxy.
- B. Valve Box Assembly: Valve box assemblies with operating nut extension is required for any size main that is 6-feet or greater below finished grade or if mains are greater than 12-inches in diameter.
 - 1. Valve boxes shall be 1 complete assembled unit composed of the valve box and extension stem that attaches and locks to the 2-inch wrench nut. The

extension shall be high strength, corrosion resistant steel construction, and permanently attached to the operating nut.

2. The operating nut extension insert shall be 1 complete assembled unit with a self-adjusting extension stem system that fits inside a standard valve box that will accommodate variable trench depths 6-feet and greater as shown in the Drawings. All moving parts of the extension stem shall be enclosed in a housing to prevent contact with the soil.
 3. A valve box-centering device designed to eliminate the shifting of the valve box against the operating nut of the valve shall be used. Valve box assembly shall be adjustable to accommodate variable trench depths 6-foot and greater as shown in the Drawings.
- C. The stem assembly shall be of a telescoping design that allows for variable adjustment length. The material shall be at minimum 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-foot-pounds without failure.
- D. Valve boxes shall have locking cast iron covers utilizing a 5-sided nut with a special wrench needed to open. Covers shall have "WATER", "SEWER", or "RECLAIMED WATER" cast into the top, as applicable
- E. Concrete Collar: Each valve installed in an unimproved area (outside of pavement, driveways or sidewalks) shall require a 24-inch by 24-inch by 6-inch concrete pad or collar as shown in the Drawings.
- F. Identification Disc: Each 16-inch or larger valve (unless otherwise shown on the Drawings) installed shall be identified by a 3-inch diameter bronze disc anchored in the concrete pad or collar in unimproved areas and/or anchored on a 4-inch by 4-inch by 18-inch long concrete post set flush with the pavement surface in improved areas. The disc shall be stamped with the following information as shown on the Drawings:
1. Size of the valve
 2. Type of valve
 3. Service
 4. Valve ID #
 5. Direction and number of turns to open
- G. Valve markers are to be made of schedule 80 PVC and have decal applied containing information as shown on the Drawings. The marker shall be the same color as the pipe being marked.

2.05 LINE STOPPING ASSEMBLIES

- A. Sleeves used to line-stop existing mains shall be provided and installed at locations as shown on the Drawings. Line-stopping sleeve shall be steel fusion epoxy coated body with stainless steel straps, bolts, nuts, and washers. Contractor shall determine the outside diameter of the existing main prior to ordering sleeve.

- B. The line-stopping equipment shall consist of a resilient sealing element, which shall be attached to and transported by a plug inserter perpendicularly into the pipe. The linear actuator shall extend and retract the Line-Stopper into and out of the pipe. When retracted from the pipe, the element and inserter shall be contained within the stopper housing.
- C. The hollow cylindrical sealing element shall be molded of natural rubber. The lower interior chamber of the element shall be enlarged into a hemispherical cavity to allow symmetrical deformation into sealing conformity with the bore of the pipe.
- D. The linear actuator shall be hydraulic and shall have a self-contained hand operated pump. The actuator shall exert a force sufficient to perpendicularly deform the cylindrical element into axially symmetrical sealing contact with the bore of the pipe. Design of actuator shall provide adequate stroke and means to continually align the line-stop bullet stopping assemblies in sizes 14-inch through 20-inch with pressure rating to 250-psig.
- E. Equalization of pressure across the sealed element shall not be required to retract the element from the pipe. No equalization fittings shall be required downstream of the line-stopper.
- F. The line-stopping equipment shall be accurately aligned on the 4-inch through 8-inch fittings by locating in the external threads of the fitting nozzle. With sizes 10-inch and 12-inch the location shall be made on the centering groove of the fitting flange.
- G. Line-stopping equipment must be capable of function and acceptance of multiple stopper heads and shall be compatible with existing system fittings.

2.06 FIRE HYDRANTS AND VALVE ASSEMBLIES

- A. Fire hydrants shall be 5-1/4-inch minimum valve opening and shall comply with the current AWWA Standard Specifications C502-54 for 150-psi working pressure. Fire hydrants shall be of ample length for 3-1/2-foot depth of bury with necessary extensions to place safety flange the required 3-inches above finished grade. Each hydrant shall be made in at least 2 sections bolted together. All interior working parts of the hydrant shall be removable from the top of the hydrant to allow repairs without removing the hydrant barrel after it has been installed. It shall be provided with 2 (two) 2-1/2-inch hose nozzles and 1 (one) 4-1/2-inch pumper nozzle, all having its specific Fire District Standard hose threads. All nozzles shall have caps attached by chains. Operating nuts shall be AWWA Standard. Drain or weep holes shall be permanently plugged by the manufacturer.
- B. Fire hydrant painting and coating shall meet the requirements of Section 09900 "Painting." Fire hydrants shall be painted silver in accordance with the present Orange County standards. Three (3) operating wrenches shall be furnished for every 10 hydrants installed or relocated.
- C. All hydrant assemblies shall incorporate anchoring hydrant fittings, including M.J. Locked Hydrant Tee with split gland to provide the locking together of the entire assembly. Gate valve shall be as specified in Specification Section 15111 "Gate Valves."

- D. All hydrants shall have a 24-inch to 48-inch square by 6-inch thick reinforced concrete shear pad as shown in the Drawings.
- E. Fire hydrants shall be located in the general location as shown on the Drawings. Final field location of all hydrants shall be as approved by the County. All hydrants shall be located no less than 5 and no more than 10-feet from the edge of pavement of the adjacent roadway and no less than 5-feet from any physical feature which may obstruct access or view of any hydrant unless otherwise approved by the County.
- F. Provide (2) fire hydrant wrenches.

2.07 SERVICE SADDLES

- A. Stainless Steel Service Saddles: Shall be epoxy or nylon coated ductile iron body with stainless steel, 18-8 type 304 straps, AWWA tapered threads for 1-inch and 2-inch to be iron pipe threads. Controlled OD saddles to be used on C905 PVC pipe, double straps to be 2-inch minimum width each, single strap to be minimum of 3-inches wide.
- B. PVC Pipe Service Saddle
 - 1. One-inch and 2-inch services utilize brass body saddle with controlled OD for 12-inches and smaller pipe.
 - 2. One-inch and 2-inch taps on existing pipes larger than 12-inches shall use controlled OD epoxy or nylon coated ductile iron body with stainless steel 18-8 type 304 straps.
 - 3. Four-inch or larger services shall be mechanical tapping sleeves.
- C. Ductile Iron Pipe Service Saddle
 - 1. One-inch services shall be direct tapped.
 - 2. Two-inch service shall use a controlled OD service tapping saddle with stainless steel straps and a ductile iron body that is either nylon or epoxy coated
 - 3. Four-inch or larger services shall be mechanical tapping sleeves.
- D. HDPE Pipe Service Saddle
 - 1. One-inch and 2-inch shall utilize controlled O.D. tapping saddle with epoxy or nylon coated stainless steel 18-8 type 304 double straps.
 - 2. Four-inch or larger, shall use wide body tapping sleeves with a broad cross section gasket set in a retaining groove that increases sealing capability as pressure increases.
- E. Concrete Pressure Pipe Service Saddle
 - 1. Tapped concrete pressure pipe shall be in accordance with AWWA M-9, using a strap-type saddle made specifically for concrete cylinder pressure pipe.
- F. Steel Pipe Service Saddle
 - 1. Welded-on steel sleeves shall be used for all sizes and applications.

2.08 CORPORATION STOPS AND CURB STOPS

- A. Corporation Stops: Shall be brass body reduced port type compatible with the polyethylene tubing and threaded in accordance with AWWA C800, AWWA C901, and shall comply with NSF-61.
- B. Curb Stops: Shall be brass body reduced port type compatible with the polyethylene tubing and threaded in accordance with AWWA C800, AWWA C901, and shall comply with NSF-61.

2.09 WATER MAIN AND RECLAIMED WATER MAIN SERVICE PIPE

- A. Polyethylene Service Pipe: One-inch and 2-inch service lines shall be polyethylene tubing conforming to AWWA C901 and AWWA C800. Tubing shall be approved for potable water use and bear the seal of the National Sanitation Foundation (NSF). The product shall be rated for a minimum working pressure of 150-psi and a (Dimension Ratio) DR-9 size. The tubing shall be designated copper tube size and the material PE-2406 cell classification minimum PE213323C in accordance with ASTM 3350.
- B. Ductile Iron Service Pipe: Services 4-inch and larger shall be DIP. If the existing main is on the same side of the street as the property to be serviced, the service pipe shall be DIP from the point of connection to the existing main to the meter assembly. If the existing main is on the opposite side of the street as the property to be serviced, at a minimum, the segment of pipe immediately upstream from the meter assembly shall be DIP.
- C. No service pipe shall terminate under a driveway.

2.10 PRESSURE GAUGES

- A. Pressure gauges shall be installed on each pump station discharge pipe as indicated on the Drawings.
- B. Pressure gauge shall be direct mounted, diaphragm (type) gauge, stainless steel case, stainless steel sensing element, liquid filled, with a 4-1/2-inch diameter dial and furnished with a clear glass crystal window and 1/4-inch shut-off (isolation) valve. Gauges shall be weatherproof.
- C. The pressure gauge face dial shall be white finished aluminum with jet-black graduations and figures and shall indicate the units of pressure measured in psi. Gauges shall be provided with pressure at normal operation at the mid range of the gauge.
- D. Nipples for connecting gauges to piping shall be Schedule 80S, Grade TP 316 seamless stainless steel, conforming to ASTM A 312. Fittings shall conform to ASTM A 403, Class WP316. Threads shall conform to ANSI B2.1. Size of pipe nipple shall match the gauge connection size.

2.11 TIE RODS

- A. Steel for tie rods and tie bolts shall conform to the requirements of ASTM Designation A 242, and rods shall be galvanized in conformance with requirements of ASTM Designation A 123.

2.12 BACK FLOW PREVENTION

- A. Reduced Pressure Backflow Preventer shall conform to the requirements of ASSE 1013, rated to 180°F and supplied with full port ball valves. The main body and access covers shall be bronze and meet ASTM B 584, the seat ring and all internal polymers shall be NSF Noryl and the seat disc elastomers shall be silicone.
- B. Dual check valves shall be required and shall be accessible for maintenance without removing the relief valve or the entire device from the line.
- C. The bottom of the preventer shall be installed a minimum of 12-inches above grade and not more than 30-inches above grade.

2.13 FLANGED COUPLING ADAPTERS

- A. All adapters shall be harnessed with the bolts across the joint (flange to flange or flange to lug) designed for the pipe test pressure.
- B. Adapter Size: Conform in size and bolt hole placement to ANSI standards for steel and/or cast iron flanges 125 or 150-pound standard unless otherwise required for connections.
- C. Exposed Sleeve Type
 - 1. Material: Steel
 - 2. Coating: Enamel
 - 3. Bolting: Carbon steel
 - 4. Acceptable Manufacturers: Dresser Manufacturing Co. - Style 128 for cast iron ductile iron and steel pipes with diameters of 2-inches through 96-inches, or equal.
- D. Buried Sleeve Type
 - 1. Material: Cast iron
 - 2. Bolting: Type 304 stainless steel conforming to ASTM A 193, Grade B8 for bolts, and ASTM A 194, Grade 8 for nuts and washers. Bolts and nuts greater than 1-1/8-inches shall be carbon steel, ASTM A 307, Grade B, with cadmium plating, ASTM A 165, Type NS.
 - 3. Acceptable manufacturers: Dresser Manufacturing Co. - Style 127 locking type for cast iron, ductile, iron, asbestos cement and steel pipes with diameters of 3-inches through 12-inches, or equal.
- E. Split Type
 - 1. Material: Malleable or ductile iron.
 - 2. Design: For use with grooved or shouldered end pipe.
 - 3. Coating: Enamel
 - 4. Acceptable Manufacturers: Victaulic Company of America - Style 741 for pipe diameters of 2-inches through 12-inches, Victaulic Company of America - Style 742 for pipe diameters of 14-inches through 16-inches, or equal.

2.14 HOSE BIBBS

- A. Hose bibs shall be brass, heavy duty, 2002 HD with 72001 vacuum breaker by A.Y. McDonald or equal.

2.15 PIPE AND VALVE IDENTIFICATION

- A. Identification systems for above-ground and below-ground valves shall be as specified in Section 09905.

2.16 EXPANSION JOINTS

- A. Expansion joints shall be of the molded bellows design with 5 convolutions manufactured of PTFE fluorocarbon conforming to ASTM D1457. Wall thickness shall be 0.077 inches or greater with less than 5% deviation at any point of the bellows. Joints shall be flanged suitable for 150 psi water working pressure and in accordance with ANSI B16.1 dimensions and bolting patterns.
- B. Flanges and T-bands of Pureflex Durcor-62 shall be provided. Bolts, nuts, and washers shall be titanium. Limit cables of 30355 and spray shield shall be provided.
- C. Expansion joints shall be Flexi-Joint 4 FIBA 5 S1 with spray shield, or equal approved by Engineer.

2.17 JOINT RESTRAINTS

A. Mechanical Joints

1. Joint restraints for mechanical joint fittings 3” through 48” shall be constructed of ductile iron conforming to ASTM A536 and shall have a working pressure rating of 350 PSI for 3–16 inch fittings and 250 PSI for 18–48 inch fittings.
2. Restraint shall be accomplished by multiple gripping wedges incorporated into a follower gland meeting the requirements of ANSI/AWWA C110/A21.10.
3. Restraints shall be Megalug Series 1100 restraints with Mega-Bond coating as manufactured by EBBA Iron or approved equal.

B. Pipe Joints

1. Joint restraints for push-on pipe joints 3” through 48” shall be constructed of ductile iron conforming to ASTM A536 and shall have a working pressure rating of 350 PSI for 3–16 inch fittings and 250 PSI for 18–48 inch fittings.
2. Restraint shall be accomplished by a wedge action restraint ring on the spigot joined to a split ductile iron ring behind the bell. Torque limiting twist off nuts shall be used to insure proper actuation of the restraining wedges.
3. Restraints shall be Megalug Series 1700 Megalug restraint harnesses with Mega-Bond coating as manufactured by EBBA Iron or approved equals.

2.18 PVC BALL VALVES

- A. PVC ball valves shall be of one piece capsule type manufactured of Type 1, Grade 1 PVC. Ball valves shall be true union design with two-way blocking capability and

shall have solvent welded socket ends. Vented PVC ball valves shall be furnished for sodium hypochlorite services.

- B. Ball valves shall have Teflon seats with Viton backing cushions and Viton O-ring seals, and shall be designed for a 150 psi working pressure at 120°F. Valves shall be supplied with ABS lever operating handles.
- C. PVC ball valves shall be Type 21 manufactured by Asahi/America, or an equal approved by the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. All ancillary equipment shall be installed in the locations shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the County before installation.
- B. After installation, all ancillary equipment shall be tested as specified for adjacent piping. If any joint or equipment proves to be defective, it shall be repaired and retested to the satisfaction of the County.
- C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures, which have a direct bearing on the location and shall be responsible for the proper location of these valves and appurtenances during the Construction of the structures.
- D. Notification and Connections to Existing Mains
 - 1. The Contractor shall submit a completed "System Connection" form to the County to schedule the connection. The request shall be made a minimum of 5-working days prior to the proposed tie-in to the existing main for pressure connections and 10-working days prior to the proposed tie-in to the existing main for non-pressure connections. In this request, the Contractor shall provide the following information:
 - a. Points of connection, fittings to be used and method of flushing and disinfection if applicable
 - b. Estimated construction time for said connections
 - c. Identify pressure and non-pressure connections
 - 2. Connections shall only be made on the agreed upon date and time. If the Contractor does not perform the Work in the agreed upon manner or schedule, the Contractor shall be required to reschedule the connection by following the procedure outlined above.
- E. Pressure Connections: Sufficient length of main shall be exposed to allow for installation of the tapping sleeve and valve and the operation of the tapping machinery. The main shall be supported on concrete pedestals or bedding rock at sufficient intervals to properly carry its own weight, plus the weight of the tapping

sleeve, valve and machinery. Any damage to the main due to improper or insufficient supports will be repaired at the Contractor's expense.

1. Prior to the tap, the Contractor shall assemble all materials, tools, equipment, labor, and supervision necessary to make the connection.
2. The Contractor shall excavate a dry and safe working area pit of sufficient size to enable the necessary Work.
3. The inside of the tapping sleeve and valve, the outside of the main and the tapping machine shall be cleaned and swabbed or sprayed with 1% liquid chlorine solution prior to beginning installation for water system pressure connections and must comply with AWWA C-651-99 or most current version.
4. After the tapping sleeve has been mounted on the main, the tapping valve shall be bolted to the outlet flange, making a pressure tight connection. Prior to beginning the tapping operation, the sleeve and valve shall be pressure tested under the observation of County personnel to 150-psi for 30-minute duration to ensure that no leakage will occur.
5. For pressure connections 4-inch through 20-inch installation, the minimum diameter cut shall be 1/2-inch less than the nominal diameter of the pipe to be attached. For larger taps, the allowable minimum diameter shall be 2 to 3-inches less than the nominal diameter of the pipe being attached. After the tapping procedure is complete, the Contractor shall submit the coupon to the County.
6. Adequate restrained joint fittings shall be provided to prevent movement of the installation when test pressure is applied.
7. The Contractor shall be responsible for properly backfilling the work area pit after the Work is completed.

F. Non-Pressure Dry Connections

1. For water service connections, no customer shall be without service for more than 6-hours. This accommodation to customers may include scheduling after Normal Working Hours.
2. The Contractor shall be ready to proceed by pre-assembling as much material as possible at the site to minimize the length of service interruption.
3. Needed pipe restraints must be installed prior to the initiation of the shutdown.
4. The excavation shall be opened and needed site preparations must be completed before the initiation of the connection work.
5. County shall postpone a service cut-off if the Contractor is not ready to proceed at the scheduled time.
6. Only County personnel shall operate the valves needed to perform the shutdown on the existing system.

G. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections in Division 15.

- H. Flanged joints shall be made with 304 stainless steel bolts, nuts and washers, unless otherwise noted. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts shall be painted the same color as the pipe. All buried bolts and nuts shall be heavily coated with two (2) coats of bituminous paint, Tnemec Series 46 – 465, Carboline Bitumastic 50, or equal.
- I. Clean iron flanges by wire brushing before installing flanged valves. Clean threaded joints by wirebrushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.
- J. Expansion and Contraction Provisions
 - 1. Rigidly support all piping with adequate provisions for expansion and contraction.
 - 2. Firmly anchor horizontal runs over 50 feet in length at the midpoint of the runs to force expansion equally toward the ends.

3.02 PAINTING

- A. All exterior surfaces of iron body valves shall be clean, dry, and free from rust and grease before coating.
- B. For valves installed underground or in valve vaults, all exterior ferrous parts of valve and actuator shall be coated at the factory with a thermally bonded epoxy coating in accordance with AWWA C550, latest revision.
- C. For aboveground service, the exterior ferrous parts of all valves shall be coated in weatherproof paint. The color of the finish coats shall be in accordance with the Orange County Utilities Standards.

END OF SECTION

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**SECTION 15111
GATE VALVES**

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope of Work: Furnish and install gate valves of the type and size and in the locations as shown on the Drawings and/or specified herein.
- B. General Design
 - 1. Resilient seat non-rising stem (NRS) gates valves shall be used for underground service and for aboveground service where shown on the Drawings.
 - 2. Resilient seat Outside Stem and Yoke (OS&Y) gate valves shall be used for aboveground service only where shown on the Drawings.

1.02 QUALITY ASSURANCE

- A. All gate valves of same type and style shall be manufactured by one (1) manufacturer.

1.03 SHOP DRAWINGS AND SUBMITTALS

- A. Submittals shall be submitted to the County/Professional for review and acceptance prior to construction in accordance with the General Conditions and specifications Section 01300 "Submittals."
- B. Shop Drawings and submittals shall be submitted to the County/Professional Engineer for review and acceptance prior to construction for the following:
 - 1. Certified Shop Drawings showing details of construction, dimensions (including laying length), and weight.
 - 2. Descriptive literature, bulletins, and/or catalogs showing all valve parts and describing material of construction by material and specification, e.g., AISI.
 - 3. Valve coatings and linings, if any.
 - 4. A complete bill of materials for all equipment.
 - 5. See individual sections for additional requirements.

1.04 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Shipping
 - 1. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed.
 - 2. Factory assembled parts and components shall be dismantled for shipment unless permission is received in writing from the County/Professional Engineer.

3. Finished surfaces of all exposed openings shall be protected by wooden blanks, strongly built and securely bolted thereto.
 4. Finished iron or steel surfaces not painted shall be properly protected to prevent rust and corrosion.
 5. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment, and proper care shall be taken to protect parts from the entrance of water during shipment, storage, and handling.
 6. Each box or package shall be properly marked to show its net weight in addition to its contents.
- B. Storage
1. Store valves and accessories in an area on the construction site protected from weather, moisture, or possible damage.
 2. Do not store valves or accessories directly on the ground.
- C. Handling
1. Handle valves and accessories to prevent damage of any nature.
 2. Carefully inspect all materials for:
 - a. Defects in workmanship and materials.
 - b. Removal of debris and foreign material in valve openings and seats.
 - c. Proper functioning of all operating mechanisms.
 - d. Tightness of all nuts and bolts.

1.05 WARRANTY AND GUARANTEES

- A. The manufacturer's warranty period shall be concurrent with the Contractor's for 1-year, unless otherwise specified, commencing at the time of final acceptance by the County.
- B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all equipment which lists for more than \$500.00 (major equipment). The County reserves the right to request warranties for equipment not classified as "major". The Contractor shall still warrant equipment not considered to be "major" in the Contractor's 1-year warranty period even though certificates of warranty may not be required.
- C. In the event that the equipment manufacturer or supplier is unwilling to provide a 1-year warranty commencing at the date of substantial completion, the Contractor shall obtain from the manufacturer a 2-year warranty commencing at the time of equipment delivery to the job site. This 2-year warranty from the manufacturer shall not relieve the Contractor of the 1-year warranty starting at the time of County acceptance of the equipment.
- D. The County shall incur no labor or equipment cost during the guarantee period.
- E. Guarantee shall cover all necessary labor, equipment, and replacement parts resulting from faulty or inadequate design, improper assembly or erection, defective

workmanship and materials, leakage, breakage, or other failure of equipment or components furnished by the manufacturer.

PART 2 - PRODUCTS

2.01 GENERAL

- A. All material supplied shall be one of the products specified in Appendix D "List of Approved Products" appended to these technical specifications.

2.02 MATERIALS

- A. Gate valves shall be resilient seat gate valves, manufactured to meet or exceed the requirements of AWWA C509/C515, latest revision, and these Specifications. All valves are to be tested in strict accordance with AWWA C509/C515.
- B. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.
- C. The minimum design working water pressure shall be minimum 250-psig.
- D. Gate valves shall be installed vertically per the Drawings and with minimum depth of cover per Table 15111-1.

**Table 15111-1
Minimum Pipe Cover Required for Valves**

Pipe Diameter (Inches)	Vertical Gate Valve Cover	
	LOCAL Roadway	Non-LOCAL Roadway*
4-inch – 8-inch	30-inch	36-inch
12-inch	36-inch	36-inch
16-inch	44-inch	48-inch
20-inch	-	50-inch
24-inch	-	54-inch
* Additional 12-inches of cover is required for all vertical valves 16-inches and greater located in the pavement		

- E. Valves 16-inches and larger shall be AWWA C515 resilient seated only (16-inches through 24-inches no gearing required).
- F. The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B for C509 valves and ductile iron ASTM A536 for C515 valves. All ferrous surfaces inside and outside shall have a fusion-bonded epoxy coating in accordance with AWWA C 550.
- G. A 2-inch wrench nut shall be provided for operating the valve. Valves 20-inches and larger shall be provide with side spur gear actuators. All valves shall open left or counter clockwise.
- H. The valves shall have non-rising stems with the stem made of cast, forged, or rolled bronze as specified in AWWA C509. Two (2) stem seals shall be provided and shall be of the O-ring type. The stem nut must be independent of the gate.

- I. The resilient sealing mechanism shall provide zero leakage at test and normal working pressure when installed with the flow from either direction.
- J. Tapping valves shall be placed vertical where possible for Water and Reclaimed Water. When tapping existing mains, valves 24-inches and above shall be furnished with NPT pipe plugs for flushing the tracks.
- K. All materials shall be in accordance with Appendix D "List of Approved Products."
- L. Provide (2) buried valve wrenches for 4-foot bury valves, (2) buried valve wrenches for 6-foot bury valves, (1) buried valve wrench with adjustable length.

PART 3 - EXECUTION

3.01 PREPARATION

- A. All valves shall be inspected upon delivery in the field to insure proper working order before installation. Valves shall be set and jointed to the pipe in the manner as set forth in the AWWA Standards for the type of connection ends furnished. All buried gate valves shall be connected using restrained joints. All valves and appurtenances shall be installed true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the County before installation.

3.02 INSTALLATION

- A. Install valves and accessories in strict accordance with manufacturer's instruction and recommendations as shown on the Drawings and as directed by the County.
- B. Carefully erect all valves and support them in their respective positions free from distortion and strain.
- C. Bolt holes of flanged valves shall straddle the horizontal and vertical centerlines of the pipe run to which the valves are attached. Clean flanges by wire brushing before installing flanged valves. Clean flange bolts and nuts by wire brushing, lubricate threads with oil and graphite, and tighten nuts uniformly and progressively. Clean threaded joints by wire brushing or swabbing. Apply Teflon joint compound or Teflon tape to pipe threads before installing threaded valves. Joints shall be watertight.
- D. Support all valves connected to pumps and equipment and in piping systems that cannot support valves.
- E. Repair any scratches, marks and other types of surface damage with original coating as supplied by the factory.
- F. Valves shall be carefully inspected, opened wide and then tightly closed and the nuts and bolts shall be tested for tightness. Special care shall be taken to prevent any foreign matter from becoming lodged in the valve seat. Any valve that does not operate correctly shall be removed and replaced.

3.03 INSPECTION AND TESTING

- A. Check and adjust all valves and accessories for smooth operation.

- B. Test valves for leakage at the same time that connecting pipelines are tested. See Section 02660 "Potable Water Distribution Piping" for pressure testing requirements. Protect or isolate any parts of valves, operators, or control and instrument systems whose pressure rating is less than the pressure tests.

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APPENDIX A
GEO TECHNICAL REPORT

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Geotechnical Engineering Report

Summerport Village Water Main Relocation
Orange County, Florida

September 24, 2014
Project No. H1145151

Prepared for:
Reiss Engineering, Inc.
Winter Springs, Florida

Prepared by:
Terracon Consultants, Inc.
Winter Park, Florida

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

September 24, 2014

Reiss Engineering, Inc.
1016 Spring Villas Pointe, Suite 2000
Winter Springs, Florida 32708



Attn: Mr. Brent White, P.E.
P: [407] 679-5358
E: brwhite@REISSENG.com

Re: Geotechnical Engineering Report
Summerport Village Water Main Relocation
Orange County, Florida

Dear Mr. White:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above-referenced project. This study was performed in general accordance with our proposal No. PH1140241 dated April 23, 2014.

This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning design/construction of the proposed water main improvements along the above-referenced project alignment.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,

Terracon Consultants, Inc.

Certificate of Authorization Number 8830

Shenna McMaster, P.E.
Sr. Geotechnical Engineer
Florida PE-57537

Jay W. Casper, P.E.
Senior Associate

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	i
1.0 INTRODUCTION	1
2.0 PROJECT INFORMATION	1
2.1 Project Description	1
2.2 Site Location and Description	2
3.0 SITE CONDITIONS	2
3.1 USDA/NRCS Soil Survey	2
3.2 Typical Profile	2
3.3 Groundwater	3
4.0 LABORATORY TESTING	3
4.1 Environmental Classification	4
4.2 Redox Potential	4
5.0 Conclusions and Recommendations	4
5.1 General Site Preparation.....	5
5.2 Pipe Subgrade (Bedding) Soils	5
5.3 Pipe Backfill Soils.....	6
5.4 Temporary Dewatering.....	7
6.0 GENERAL COMMENTS	7

TABLES

Table 1	Corrosion Series Testing Results for Soil
Table 2	Soil Test Evaluation for Ductile Iron Pipe

APPENDIX A – FIELD EXPLORATION

Exhibit A-1	Topographic Vicinity Map
Exhibit A-2	USDA Soils Map
Exhibit A-3	Soil Survey Descriptions
Exhibit A-4	Soil Boring Location Plan and Profiles
Exhibit A-5	Field Exploration Description

APPENDIX B – SUPPORTING DOCUMENTS

Exhibit B-1	General Notes
Exhibit B-2	Unified Soil Classification System

EXECUTIVE SUMMARY

A geotechnical investigation has been performed for the water main relocation west of the intersection of Summerport Village Parkway and CR 535/ Ficquette Road in Orange County, Florida. A total of four (4) borings, designated as B-1 through B-4, were performed to a depth of 10 feet below the existing ground surface along the proposed water main alignment. This report provides geotechnical engineering recommendations regarding design and construction of the water main at the site.

Based on the information obtained from our geotechnical exploration, it appears that the site can be developed for the proposed project. The following geotechnical considerations were identified:

- Soil conditions observed were mostly sands with varying amounts of silt. Clayey sand was found in the western most boring below a depth of 6 feet.
- Groundwater levels were observed at depths varying from 7 to more than 10 feet below existing grade during the field exploration. Seasonal high groundwater levels are generally expected to be 5 to 6 feet below existing grade within the project area.
- Depending on groundwater levels at the time of construction and the depth of pipe installation, dewatering may be required to achieve adequate compaction of the pipe subgrade soils.

This summary should be used in conjunction with the entire report for geotechnical design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT SUMMERPORT VILLAGE WATER MAIN RELOCATION ORANGE COUNTY, FLORIDA

Terracon Project No. H1145151

September 24, 2014

1.0 INTRODUCTION

A geotechnical investigation has been performed for the water main relocation west of the intersection of Summerport Village Parkway and CR 535/ Ficquette Road in Orange County, Florida. The approximate location of the proposed water main alignment is shown on the Topographic Vicinity Map included as Exhibit A-1 in Appendix A. A total of four (4) borings, designated as B-1 through B-4, were performed to a depth of 10 feet below the existing ground surface along the proposed force main alignment. Logs of the borings along with boring location plans are included in Appendix A of this report.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to potential development of the site regarding:

- Subsurface soil conditions.
- Groundwater conditions.
- Environmental classification and redox potential for use in pipe selection.
- Pipe subgrade preparation.
- Pipe backfill placement.

2.0 PROJECT INFORMATION

2.1 Project Description

The project consists of the installation of about 1,200 lineal feet of 24-inch water main, just south of the Lake Cawood neighborhood and along Summerport Village Parkway between CR 535/Ficquette Road and Lake Smith Circle. It is our understanding that proposed pipe invert depths will typically be within 8 feet of existing grade along the alignment. We also understand that the water main will be installed by open trench methods.

2.2 Site Location and Description

ITEM	DESCRIPTION
Location	Extending west of the intersection of Summerport Village Parkway and CR 535/Ficquette Road (See Exhibit A-4).
Current Ground Cover	Proposed easement is open space adjacent to the roadway and residential neighborhood.
Existing Topography	Based on the USGS topographic quadrangle map entitled, "Windermere, Florida," ground surface elevations range from about +115 to +120 feet along the water main alignment.

3.0 SITE CONDITIONS

3.1 USDA/NRCS Soil Survey

The Soil Survey of Orange County, Florida as prepared by the United States Department of Agriculture (USDA), Soil Conservation Service (SCS; later renamed the Natural Resource Conservation Service - NRCS), identifies the soil types along the subject alignment as: *Candler fine sand, 0 to 5 percent slopes (4)* and *Tavares fine sand, 0 to 5 percent slopes (46)*. These soils may have been modified by mass-grading for the Summerport community. It should be noted that the Soil Survey is not intended as a substitute for site-specific geotechnical exploration; rather it is a useful tool in planning a project scope in that it provides information on soil types likely to be encountered. Boundaries between adjacent soil types on the Soil Survey maps are approximate (included in Appendix as Exhibit A-2). Descriptions of the mapped soil units are included in Appendix A as Exhibit A-3.

3.2 Typical Profile

Based on the results of the borings, subsurface conditions along the force main alignment can be generalized as:

- Loose to medium dense fine sand (SP) and fine sand with silt (SP-SM) throughout the explored depth of 10 feet below existing grade with clayey fine sand (SC) observed at a depth of 6 feet in the western-most boring (B-1).

Conditions encountered at each boring location are indicated on the individual boring profiles. Stratification boundaries on the boring logs represent the approximate location of changes in soil types; the in-situ transitions between materials may be gradual. Details for each of the borings can be found in profile form in Appendix A of this report. Descriptions of our field exploration are included as Exhibit A-5 in Appendix A.

3.3 Groundwater

The boreholes were observed during drilling for the presence and level of groundwater. Groundwater was observed in the borings at depths ranging from 7 to more than 10 feet below existing grade.

It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the boring was performed. In addition, perched water can develop within higher permeability soils overlying less permeable soils. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the boring logs.

We estimate that during the wet season, with rainfall and recharge at a maximum, groundwater levels will be about 5 to 6 feet below existing grades throughout the project area. Our estimates of the seasonal groundwater conditions are based on the USDA Soil Survey, the encountered soil types (including the encountered mottling), and the encountered water levels.

Estimates of the normal seasonal high water table presented in this report are based on and limited by the data collected during our geotechnical exploration, and the referenced published documents. Estimates of the normal seasonal high assume normal precipitation volumes and distribution. These seasonal water table estimates do not represent the temporary rise in water table that occurs immediately following a storm event, including adjacent to other stormwater management facilities. This is different from static groundwater levels in wet ponds and/or drainage canals which can affect the design water levels of new, nearby ponds. The observed high water table may vary from normal when affected by extreme weather changes, localized or regional flooding, karst activity, future grading, drainage improvements, or other construction that may occur on or around the site following the date of this report.

4.0 LABORATORY TESTING

The laboratory testing program was performed on selected soil samples obtained from our borings to assist in the visual classification. The laboratory testing program included single sieve (no. 200) grain size analyses, Atterberg limits tests, moisture content tests, redox potential tests and corrosion series testing. The laboratory index test results for the borings are shown adjacent to the boring profiles on Exhibit A-4 in the Appendix. The results of the corrosion series and redox potential testing are presented on Table 1.

4.1 Environmental Classification

Two (2) soil samples were obtained from the borings for corrosion testing to determine subsurface environmental conditions. The environmental classifications are based on the 2009 FDOT Structures Design Guidelines. Environmental classification testing included pH, chlorides, sulfates and resistivity tests. The environmental classification should be classified as slightly aggressive for use in selecting an appropriate class of concrete and steel. The corrosion series test results are summarized in Table 1 in the Appendix.

4.2 Redox Potential

Two (2) soil samples were obtained from the borings for redox potential testing. The redox potential test results are summarized in Table 1 in the Appendix.

The Ductile Iron Pipe Research Association (DIPRA) uses a 10-point soil evaluation procedure to determine whether corrosion protection measures, such as polyethylene encasement, are warranted due to local soil conditions. The 10-point system considers soil properties such as pH, resistivity, and redox potential, and assigns a corresponding point value based on laboratory results for the properties in question. Corrosion protection is recommended in soils with a total point value of 10 or more points based on this system.

Based on results of laboratory testing from soil samples obtained from the borings, the tested soils represent a value of only 3 points, based on the DIPRA publication, "Polyethylene Encasement", May 2007 revision, which implies that additional corrosion protection is not necessary if ductile iron pipe is used.

A summary of the soil evaluation procedure is presented on Table 2 in the Appendix.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The following conclusions and recommendations are based on the project characteristics previously described, the data obtained in our field exploration and our experience with similar subsurface conditions and construction types.

If the proposed pipe alignment or installation depth are significantly different from those previously described, or if subsurface conditions different from those disclosed by the borings are encountered during construction, we should be notified immediately so that we might review and modify, if necessary, the following recommendations in regards to such changes. The general guidelines included in this report are not intended to supersede any more stringent requirements mandated by other municipal specifications.

5.1 General Site Preparation

The following general procedures are recommended for site preparation:

- All excavations required for pipe installation should be performed in accordance with appropriate Occupational Safety and Health Administration (OSHA) excavation standards.
- If safe side slopes cannot be maintained or are not desired due to other considerations, a properly designed braced excavation, trench shield, sheet piling, or permeation grouted wall would be required for stable excavations. All shields, shoring and bracing systems, or sheet piling should be designed and reviewed by an experienced Professional Engineer registered in the State of Florida. Adjacent traffic loads, induced vibrations and/or other factors should be considered in the design of these stabilization systems.
- Groundwater was observed at depths varying from 7 to more than 10 feet below existing grade. Seasonal high groundwater levels are anticipated to be about 5 to 6 feet below existing grades throughout the site. Based on this information and the proposed embedment depths of the pipe, dewatering may be required to facilitate construction, backfilling, and compaction in the dry.

5.2 Pipe Subgrade (Bedding) Soils

Regarding the pipe subgrade soils, we offer the following recommendations:

- Generally, soils encountered in the borings appear suitable to support the proposed force main. Unsuitable soils were not observed within the borings. However, since the borings were widely spaced along the pipeline alignment, unsuitable soils could be encountered in other locations along the alignment where borings were not performed.
- If unsuitable soils are encountered at the pipe subgrade (bedding) depth, these soils should be removed and replaced with sand and/or stone (gravel) to a depth that provides a firm and unyielding subgrade (bedding) surface.
- The bedding soil beneath the pipe should be properly shaped to completely support the pipe section and areas should be excavated to accommodate any bells or other raised portions of the pipe to help avoid point loading conditions.
- If dense or cemented soils are encountered within 1 foot below the pipe bottom, it is recommended that these soils be removed to a depth of 1 foot below the pipe bottom and replaced with clean granular fill material to avoid uneven loading (point loads) of pipes and fittings.

- A minimum separation of 2 feet between the bottom of the subgrade level and the groundwater level is recommended during construction and backfilling operations. A properly designed dewatering system may be required to maintain this minimum separation to facilitate compaction.
- After the subgrade soils have been prepared as recommended above, the pipe may be installed.

5.3 Pipe Backfill Soils

Regarding the pipe subgrade soils we offer the following recommendations:

- Once the pipe has been laid in the excavation trench and approved, backfill should be carefully deposited and compacted to the centerline of the pipe on both sides.
- Compaction of backfilled soils above the centerline of the pipe to the proposed final grade should be accomplished in lift thicknesses no thicker than 12 inches.
- Fill should be non-plastic, granular soils (clean sands) free of roots and debris. The excavated clean granular soils should be suitable for use as pipe backfill. Inorganic fine sand (SP) and fine sand with silt (SP-SM) are acceptable for this use.
- From 1 foot above the pipe to the finished grade elevation, compaction should be accomplished with a small plate or hand-guided drum type vibratory compactor. Extreme caution should be exercised when operating vibratory equipment near existing structures. Smaller hand compactors should be utilized in all restricted areas, such as beneath pipe haunches and to 1 foot above the pipe to help provide uniform compaction around the pipe.
- At least one (1) density test per 300 lineal feet of pipe length per lift should be performed to verify that the soil has been compacted to at least 95 percent of its modified Proctor maximum dry density (ASTM D-1557). Care should be taken to also test the haunch area and to 1 foot above the pipe on this same frequency of one (1) test per 300 lineal feet of pipe installed.
- If compaction difficulties arise during construction, the Geotechnical Engineer should be consulted to provide further recommendations.

5.4 Temporary Dewatering

Groundwater was observed during the field exploration at depths of 7 to more than 10 feet below existing grade. Seasonal high groundwater levels are anticipated to be about 5 to 6 feet below existing grades throughout the site. Depending on prevailing groundwater conditions at the time of construction, dewatering may be required to facilitate construction, backfilling, and compaction in the dry. Regarding dewatering, we offer the following recommendations:

- Dewatering operations at this site for pipe installation should be accomplished with a properly designed dewatering system operating outside the excavation limits.
- The dewatering system should be adequate to lower groundwater levels to at least 2 feet below the lowest compaction surface and keep it there during backfilling to facilitate excavations in the dry and proper compaction of bedding and backfill soils.
- The Contractor should review the boring profiles prior to implementing the dewatering system to be aware of the encountered locations of dense soils.
- The construction should be sequenced so that the dewatering system is not turned off until the pipe has enough weight placed over it to counteract an uplift force equivalent to the height of standing water above the base of the pipe. The resisting weight of soil over the pipe should be calculated using a buoyant unit weight of the soil of 50 pounds per cubic foot.

6.0 GENERAL COMMENTS

Terracon should be retained to review the final design plans and specifications so comments can be made regarding interpretation and implementation of our geotechnical recommendations in the design and specifications. Terracon also should be retained to provide observation and testing services during grading, excavation, foundation construction and other earth-related construction phases of the project.

The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

Geotechnical Engineering Report

Summerport Village Water Main Relocation ■ Orange County, Florida

September 24, 2014 ■ Terracon Project No. H1145151



The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

TABLES

TABLE 1
CORROSION SERIES TESTING RESULTS FOR SOILS
SUMMERPORT VILLAGE WATER MAIN RELOCATION
ORANGE COUNTY, FLORIDA
TERRACON PROJECT NO. H1145151

Boring Number	Sample Depth (feet)	pH	Minimum Resistivity (ohm-cm)	Chlorides (ppm)	Sulfates (ppm)	Sulfides	Redox Potential (mV)	Substructural Environmental Classification	
								Steel	Concrete
B-1	5.0	7.6	47,000	60	20	trace	238	Slightly Aggressive	Slightly Aggressive
B-4	8.5	7.4	11,000	60	110	trace	240	Slightly Aggressive	Slightly Aggressive

TABLE 2
SOIL TEST EVALUATION FOR DUCTILE IRON PIPE
SUMMERPORT VILLAGE WATER MAIN RELOCATION
ORANGE COUNTY, FLORIDA
TERRACON PROJECT NO. H1145151

Soil Characteristics	Points
Resistivity (ohm-cm)	
<1500	10
1500-1800	8
1800-2100	5
2100-2500	2
2500-3000	1
>3000	0
pH	
0-2	8
2-4	5
4-6.5	0
6.5-7.5	0
7.5-8.5	0
>8.5	3
Redox Potential (mV)	
>100	0
50-100	3.5
0-50	4
<0	5
Sulfides	
Positive	3.5
Trace	2
Negative	0
Moisture	
Poor drainage, continuously wet	2
Fair drainage, generally moist	1
Good drainage, generally dry	0

Soil Test Results (worst case)		Point Value
Resistivity	9,000	0
pH	7.4 (low), 7.6 (high)	0
Redox potential	238	0
Sulfides	Trace	2
Moisture	Fair drainage, generally moist	1
Total Points		3

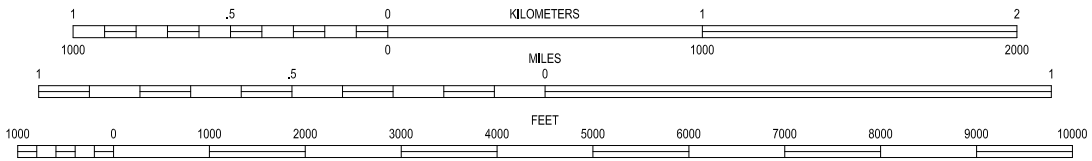
Corrosion protection is recommended where total point value is 10 or more.

Source: "Polyethylene Encasement" publication, Ductile Iron Pipe Research Association, May 2007 revision

APPENDIX A
FIELD EXPLORATION



SCALE 1:24 000



CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SECTION: 14, 23
TOWNSHIP: 23 SOUTH
RANGE: 27 EAST

WINDERMERE, FLORIDA
ISSUED: 1953 REVISED: 1980
7.5 MINUTE SERIES (QUADRANGLE)



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Project Mngr:	SM
Drawn By:	SW
Checked By:	SM
Approved By:	JWC

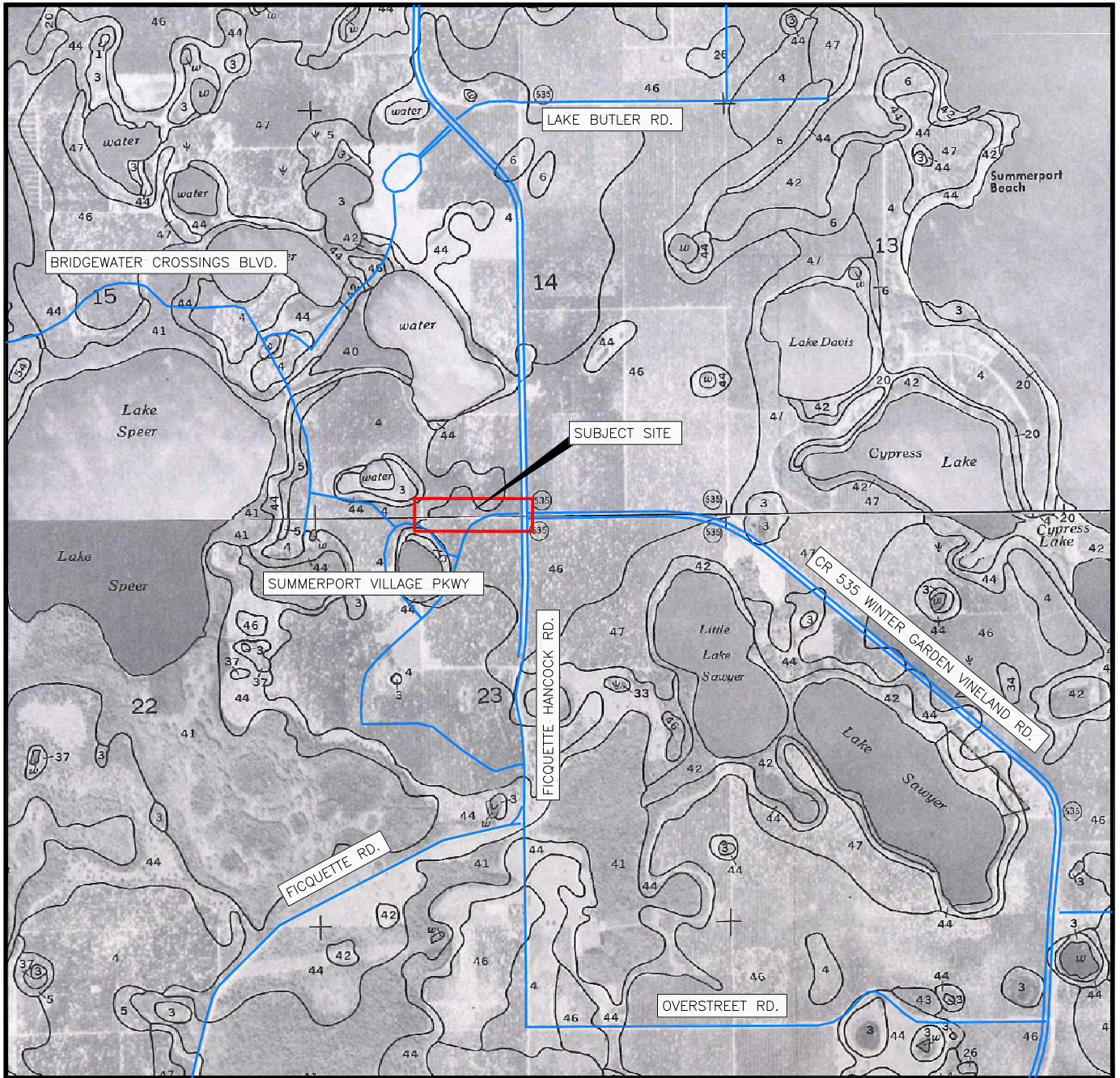
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Date:	9-15-14

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TOPOGRAPHIC VICINITY MAP
GEOTECHNICAL ENGINEERING EVALUATION
SUMMERPORT VILLAGE WATER MAIN RELOCATION
SUMMERPORT VILLAGE PARKWAY AND FICQUETTE ROAD
ORANGE COUNTY, FLORIDA

EXHIBIT
A-1

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SCALE 1" = 2000'



U.S.D.A. SOIL SURVEY FOR ORANGE COUNTY, FLORIDA
ISSUED: 1989

SECTION: 14, 23
 TOWNSHIP: 23 SOUTH
 RANGE: 27 EAST

ORANGE COUNTY SOILS MAP INDEX	
4	CANDLER FINE SAND, 0 TO 5 PERCENT SLOPES
44	SMYRNA FINE SAND
46	TAVARES FINE SAND, 0 TO 5 PERCENT SLOPES



Project Mngr:	SM	Project No.	H1145151
Drawn By:	SW	Scale:	AS SHOWN
Checked By:	SM	File No.	H1145151-2
Approved By:	JWC	Date:	9-15-14


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U.S.D.A. SOILS MAP
GEOTECHNICAL ENGINEERING EVALUATION
SUMMERPORT VILLAGE WATER MAIN RELOCATION
SUMMERPORT VILLAGE PARKWAY AND FICQUETTE ROAD
ORANGE COUNTY, FLORIDA

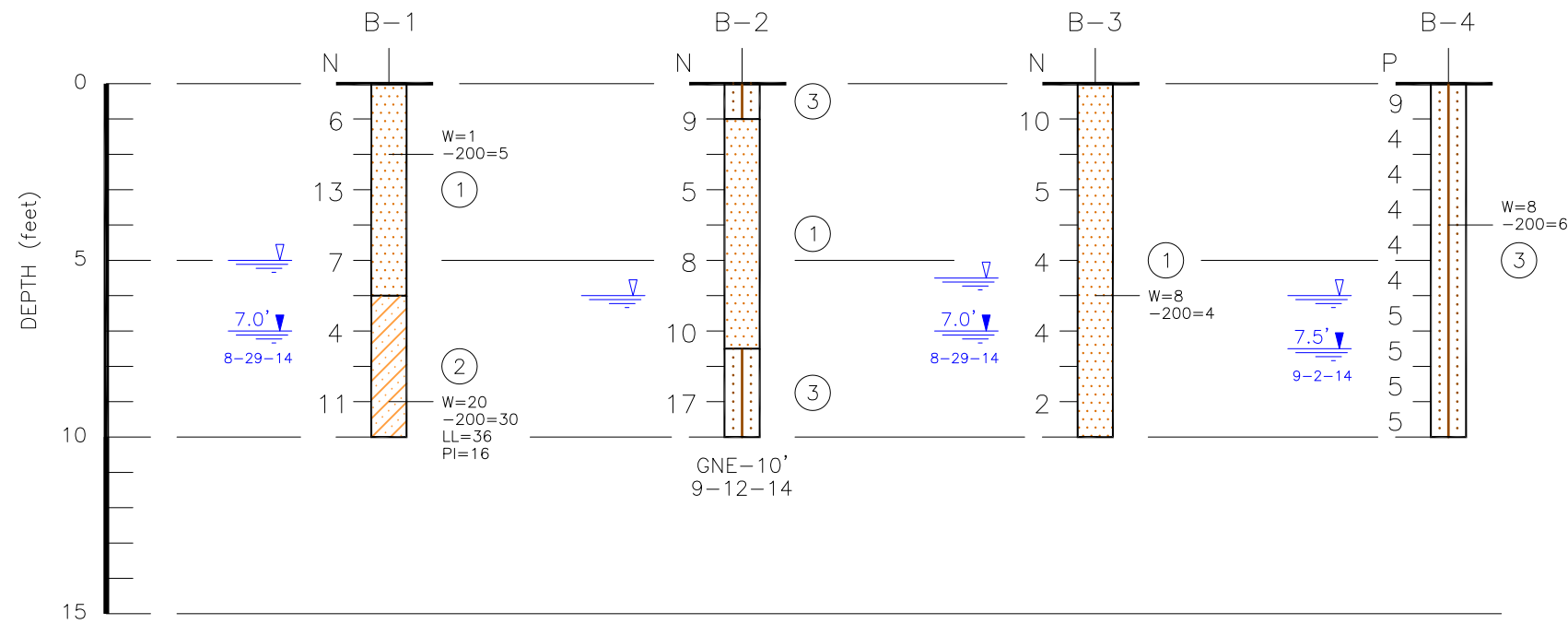
EXHIBIT
A-2

Soil Survey Descriptions

4 – Candler fine sand, 0 to 5 percent slopes. This soil type is nearly level to gently sloping and excessively drained. It is typically found on the uplands. In its natural state, during years of normal rainfall, this soil type has a seasonal high water table at a depth of greater than 80 inches (6.7 feet). Candler fine sand is predominantly sandy throughout the defined profile of 80 inches (6.7 feet).

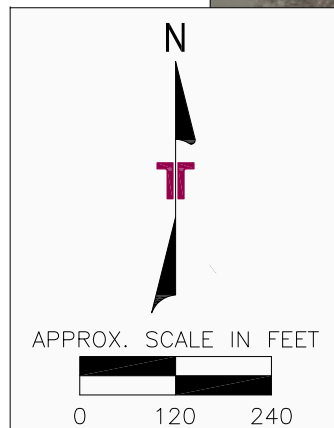
46 – Tavares fine sand, 0 to 5 percent slopes. This soil type is nearly level to gently sloping and moderately well drained. It is typically found on low ridges and knolls on the uplands. In its natural state and during years of normal rainfall, Tavares fine sand has an apparent seasonal high water table at a depth of between 40 and 80 inches (3.3 and 6.7 feet) for more than 6 months, receding to a depth of more than 80 inches (6.7 feet) during dry seasons. Tavares fine sand is predominantly sandy throughout the defined profile of 80 inches (6.7 feet).

N:\Projects\2014\H1145151\PROJECT DOCUMENTS (Reports-Letters-Drafts to Clients)\cad\5151-plan and borings.dwg



- ① LIGHT GRAY-BROWN TO LIGHT BROWN FINE SAND (SP)
- ② ORANGE-BROWN, LIGHT BROWN MOTTLED CLAYEY FINE SAND (SC)
- ③ LIGHT BROWN AND DARK BROWN TO BROWN FINE SAND WITH SILT (SP-SM)
- (SP) UNIFIED SOIL CLASSIFICATION GROUP SYMBOL
- OBSERVED GROUNDWATER LEVEL (feet) (DATE NOTED)
- ESTIMATED SEASONAL HIGH GROUNDWATER LEVEL
- GNE-10' GROUNDWATER LEVEL NOT ENCOUNTERED TO DEPTH OF BORING (10 FEET)
- N STANDARD PENETRATION TEST RESISTANCE IN BLOWS PER FOOT (AUTO HAMMER)
- P PENETROMETER READING
- W NATURAL MOISTURE CONTENT (%)
- 200 FINES PASSING No. 200 SIEVE (%)
- LL LIQUID LIMIT (%)
- PI PLASTICITY INDEX

- APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING
- APPROXIMATE LOCATION OF AUGER BORING



Project Mgr:	SM	Project No.	H1145151
Drawn By:	SW	Scale:	AS SHOWN
Checked By:	SM	File No.	H1145151-4
Approved By:	JWC	Date:	9-23-14

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SOIL BORING LOCATION PLAN AND BORING PROFILES
GEOTECHNICAL ENGINEERING EVALUATION
SUMMERPORT VILLAGE WATER MAIN RELOCATION
SUMMERPORT VILLAGE PARKWAY AND FICQUETTE ROAD
ORANGE COUNTY, FLORIDA

EXHIBIT
A-4

Field Exploration Description

The boring locations were laid out at the project site by the project surveyor. The locations indicated on the attached diagram are approximate

The SPT soil borings were drilled with a rotary drilling rig equipped with an automatic hammer. The boreholes were advanced with a cutting head and stabilized with the use of bentonite (drillers' mud). Soil samples were obtained by the split spoon sampling procedure in general accordance with the Standard Penetration Test (SPT) procedure. In the split spoon sampling procedure, the number of blows required to advance the sampling spoon the last 12 inches of an 18-inch penetration or the middle 12 inches of a 24-inch penetration by means of a 140-pound hammer with a free fall of 30 inches, is the standard penetration resistance value (N). This value is used to estimate the in-situ relative density of cohesionless soils and the consistency of cohesive soils. The sampling depths and penetration distance, plus the standard penetration resistance values, are shown on the boring logs.

A CME automatic SPT hammer was used to advance the split-barrel sampler in the borings performed on this site. A significantly greater efficiency is achieved with the automatic hammer compared to the conventional safety hammer operated with a cathead and rope. This higher efficiency has an appreciable effect on the SPT-N value. The effect of the automatic hammer's efficiency has been considered in the interpretation and analysis of the subsurface information for this report.

Due to access restrictions, Boring B-4 was performed as a manual auger boring with penetrometer readings. The hand auger boring procedure consisted of manually turning a 3 inch diameter, 6 inch long sampler into the soil until it is full. The sampler was then retrieved and the soils in the sampler were visually examined and classified. The procedure was repeated until the desired termination depth was achieved. Samples of representative strata were obtained for further visual examination and classification in our laboratory.










The penetrometer used during the hand auger procedure is a hand operated device which obtains the relative resistance to penetration of a standard size cone shaped tip into the soil. As the cone is pushed into the soil the maximum pressure is indicated on a hydraulic gauge or proving ring. These pressure readings are shown on the attached boring profile at the tested locations and depths. Typical correlations between these readings and SPT tests in similar soils of similar density enable an evaluation of the relative density of predominantly granular soils.

Field logs of each boring were prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation of the samples. Portions of the samples from the borings were sealed in glass jars to reduce moisture loss, and then the jars were taken to our laboratory for further observation and classification. Upon completion, the boreholes were backfilled with the site soil.

APPENDIX B
SUPPORTING DOCUMENTS

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING	 Auger Cuttings  Grab Sample  Shelby Tube	 Rock Core  No Recovery  Standard Penetration Test	WATER LEVEL	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	FIELD TESTS	(HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer
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DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS <small>(More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance</small>		CONSISTENCY OF FINE-GRAINED SOILS <small>(50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance</small>		
	Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (psf)	Standard Penetration or N-Value Blows/Ft.
Very Loose	0 - 3	Very Soft	less than 500	0 - 1	
Loose	4 - 9	Soft	500 to 1,000	2 - 4	
Medium Dense	10 - 29	Medium Stiff	1,000 to 2,000	4 - 8	
Dense	30 - 50	Stiff	2,000 to 4,000	8 - 15	
Very Dense	> 50	Very Stiff	4,000 to 8,000	15 - 30	
		Hard	> 8,000	> 30	

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $1 > Cc > 3$ ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F,G,H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F,G,H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
			$Cu < 6$ and/or $1 > Cc > 3$ ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G,H,I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G,H,I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above "A" line ^J	CL	Lean clay ^{K,L,M}	
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K,L,M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K,L,M,N}
			Liquid limit - not dried			Organic silt ^{K,L,M,O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K,L,M}	
			PI plots below "A" line	MH	Elastic Silt ^{K,L,M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K,L,M,P}
			Liquid limit - not dried			Organic silt ^{K,L,M,Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

$$C_u = D_{60}/D_{10} \quad C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

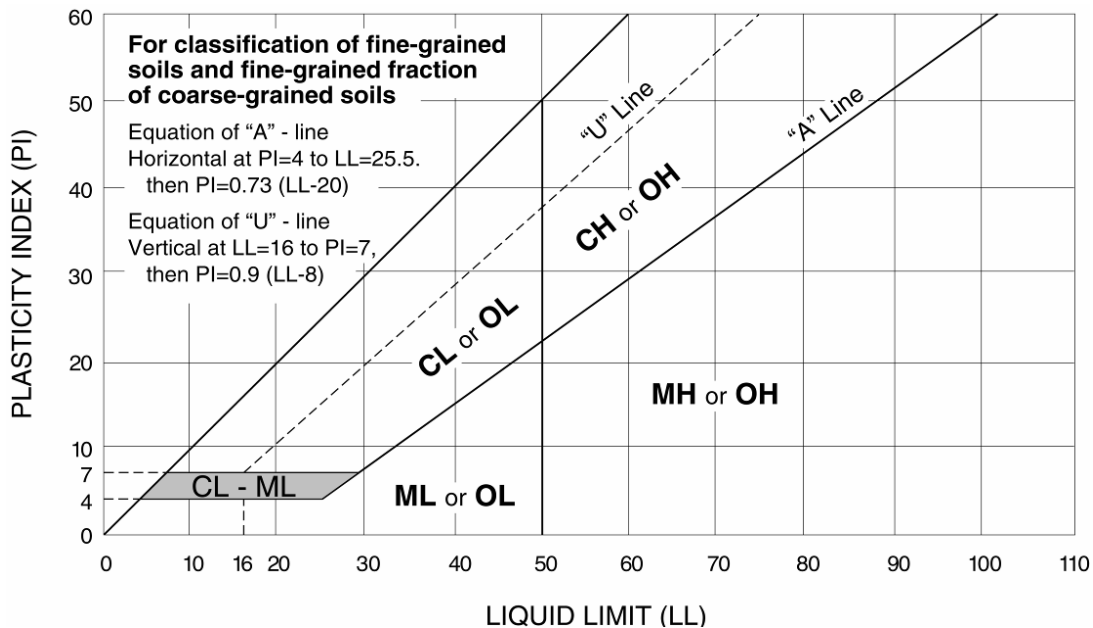
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



Groundwater Sampling / Testing

Summerport Village Water Main Relocation
Summerport Village Parkway and Ficquette Road
Orange County, Florida

September 24, 2014
Project No. H1147164



Prepared for:
Reiss Engineering, Inc.
Winter Springs, Florida

Prepared by:
Terracon Consultants, Inc.
Winter Park, Florida

terracon.com

Terracon

Environmental



Facilities



Geotechnical



Materials

September 24, 2014



Reiss Engineering, Inc.
1016 Spring Villas Point
Winter Springs, Florida 32708

Attn: Mr. Brent R. White, P.E.
P: [407] 679-5358
Email: brwhite@reisseng.com

Re: Groundwater Sampling/Testing
Summerport Village Water Main Relocation
Summerport Village Parkway and Ficquette Road
Orange County, Florida
Terracon Project No. H1147164

Dear Mr. White:

Terracon Consultants, Inc. (Terracon) is providing this report to Reiss Engineering, Inc. (client) documenting groundwater testing results at the above-referenced pump station project site. The work was conducted in general accordance with our proposal PH1140241 dated March 31, 2014 incorporated into the Notice to Proceed you provided on August 1, 2014.

PROJECT INFORMATION

The project involves proposed water main realignment south of the Lake Cawood neighborhood in proximity to Summerport Village Parkway, west of Ficquette Road, in Orange, County, Florida. A Topographic Vicinity Map showing the general location of the water main realignment area is provided as Exhibit 1 in Appendix A.

Terracon understands that dewatering may be conducted to install the water main that would require a NPDES Permit for off-site discharge. The intent of this groundwater sampling event was to test groundwater for parameters listed in the NPDES Generic Permit for Discharge of Produced Groundwater from Any Non-contaminated Site Activity [62-621.300(2)].

REGULATORY DATABASE SEARCH

A review of the Florida Department of Environmental Protection's (FDEP's) Map Direct website was conducted to identify regulated facilities and contaminated properties in proximity of project area to help determine if groundwater contaminant plumes could be mobilized by proposed dewatering

Terracon Consultants, Inc. 1675 Lee Road Winter Park, FL 32789
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activities. Locations of regulated facilities on the FDEP's databases identified in the project area are identified on a map obtained from the Map Direct website, which is provided with a database legend in Appendix B.

TEMPORARY MONITORING WELL INSTALLATION AND SAMPLING

Terracon installed one shallow temporary monitoring well (TMW-2) on August 29, 2014. Temporary monitoring well location TMW-2 is indicated on Exhibit 2 in Appendix A. The temporary monitoring well was constructed as follows:

- Installation of 10 feet of 2-inch diameter, 0.006-inch machine slotted polyvinyl chloride (PVC) well screen with a threaded bottom cap. The screen for temporary monitoring well TMW-2 was set approximately 8 to 18 feet below ground surface (bgs) to bracket the groundwater table, which was encountered approximately 8.5 feet bgs.
- Installation of 2-inch diameter, threaded, flush-joint PVC riser pipe to the surface and sticking up above the surface approximately 0.8 feet.
- Addition of pre-sieved 30/45 graded silica sand for annular sand pack around the well screen.
- The temporary monitoring well was developed by swabbing and over-pumping. Development and sampling purge water was spread on the surface adjacent to the well to evaporate or infiltrate.
- The temporary monitoring well was removed after sampling and the borehole backfilled with native soils to surface.

A groundwater sample was collected from temporary monitor well TMW-2 on September 8, 2014. Sampling procedures were conducted in accordance with the FDEP standard operating procedures DEP-SOP-001/01, FS2200. Groundwater depth measurement indicated on the field sampling log are relative to the top of well casing, which stuck up above ground surface. Physical parameters including temperature, pH, conductivity, dissolved oxygen, and turbidity were monitored while purging during groundwater sampling efforts. Groundwater pH measurement at temporary monitoring well TMW-2 was within the allowable 6.0 to 8.5 standard units referenced in the permit conditions. The groundwater sample was collected upon equilibration of field parameter measurements. Copies of the groundwater field equipment calibration logs and monitoring well sampling log are included in Appendix C.

The groundwater sample was placed in laboratory prepared glassware and stored on ice in a cooler. The sample cooler and completed chain-of-custody record were delivered to Accutest Laboratories for analysis of parameters listed in the NPDES Generic Permit for the Discharge of Produced Ground Water from any Non-Contaminated Site Activity. Groundwater analysis included EPA Methods 8260 (benzene and naphthalene), 6010 (cadmium, copper, lead, zinc), 1631 (low level mercury), 7196A (hexavalent chromium), SM5310B total organic carbon (TOC) and SM4500H (pH). Additionally, hardness was measured, and total recoverable petroleum hydrocarbons (TRPH) analysis was performed by the FL-PRO method to evaluate samples with TOC concentration exceeding the NPDES screening value for fresh water. The laboratory report and chain-of-custody record is included in Appendix D.

GROUNDWATER ANALYTICAL RESULTS

The groundwater analytical results were compared to threshold screening concentrations listed in the NPDES Generic Permit for Discharge of Produced Groundwater from Any Non-contaminated Site Activity [Table 1, 62-621.300(2)]. A summary of the laboratory results is provided on the following table.

Laboratory Analytical Results Summary – September 8, 2014

Parameter	TMW-2	NPDES Screening Values for Fresh Water	GCTLs	SWCTLs
Total Organic Carbon [TOC (mg/L)]	5.8	10.0	None	None
TRPH (mg/L)	0.182 I	5.0	5.0	5.0
pH, (standard units) Field/Laboratory levels	7.24 / 5.91	6.0-8.5	None	None
Total Recoverable Mercury (ug/L)	0.0082	0.012	2	0.012
Total Recoverable Cadmium (ug/L)	0.50 U	9.3	5	**
Total Recoverable Copper (ug/L)	1.0 U	2.9	1000	**
Total Recoverable Lead (mg/L)	0.0011 U	0.03	0.015	**
Total Recoverable Zinc (ug/L)	7.6 I	86.0	5000	**
Total Recoverable Chromium (Hex.) (ug/L)	8.0 U	11.0	100	11
Benzene (ug/L)	0.24 U	1.0	1	71.28
Naphthalene (ug/L)	1.2 I	100.0	14	26
Hardness (mg/L)	165	None	None	None

Bold numbers exceed NPDES Generic exceed NPDES Generic Permit Discharge Criteria

mg/L – milligrams per liter

ug/L – micrograms per liter

U - Indicates the compound was analyzed for, but not detected at reported concentration.

I - The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit.

GCTLs-Groundwater Cleanup Target Levels

SWCTLs – Surface Water Cleanup Target Levels

** - Hardness dependent

Reported concentrations exceeded the NPDES Generic Permit screening values for discharges as follows:

- The pH level reported by the laboratory for the groundwater sample collected from monitoring well TMW-2 is slightly below the NPDES screening value range for freshwater. However, pH measurements collected in the field while purging the monitoring well prior to sampling were within the allowable range for NPDES discharge.

CONCLUSIONS

Based on the groundwater analytical results:

- Regulatory authorization to conduct groundwater treatment may be required in conjunction with NPDES discharge.
- Terracon did not consult the FDEP on the placement of monitoring wells. The sampling results in this report may not satisfy the NPDES Notice of Intent (NOI) requirements. Additional sampling may be necessary prior to dewatering discharge.

RECOMMENDATIONS

Based on the sampling results, Terracon recommends the following:

- The laboratory pH measurement indicates buffering may be required in order to meet the NPDES discharge criteria. Upon startup of the dewatering system, a sample of the discharge water should be collected and measured for pH to evaluate whether buffering is needed to meet discharge requirements.

Groundwater Sampling / Testing
Summerport Village Water Main Relocation
Orange County, Florida
September 24, 2014 ■ Project No. H1147164

Terracon

Terracon appreciates the opportunity to conduct these sampling activities requested by Reiss Engineering, Inc. If you have questions concerning the work performed, please call the undersigned at 407-740-6110.

Sincerely,
Terracon Consultants, Inc.



Igor Karimov
Project Engineer


9/24/14

Eric Krebill, P.G.
Florida Registration No. 1162

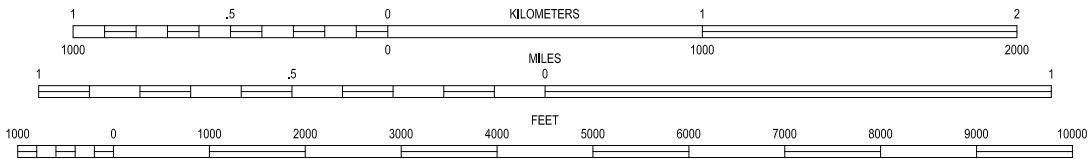
- Appendix A Site Map Exhibits
- Appendix B FDEP Map Direct Summary
- Appendix C Groundwater Sampling and Equipment Calibration Logs
- Appendix D Laboratory Results



APPENDIX A



SCALE 1:24 000



CONTOUR INTERVAL 5 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

SECTION: 14, 23
TOWNSHIP: 23 SOUTH
RANGE: 27 EAST

WINDERMERE, FLORIDA
ISSUED: 1953 REVISED: 1980
7.5 MINUTE SERIES (QUADRANGLE)



Sep17, 2014--10:41:am N:\Projects\2014\H1147164\PROJECT DOCUMENTS (Reports-Letters-Drafts to Clients)\cad\7164-usgs.dwg

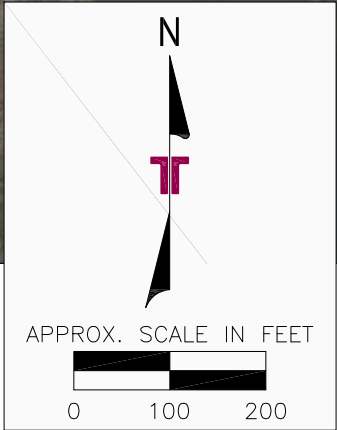
Project Mngr:	EK
Drawn By:	SW
Checked By:	EK
Approved By:	EK

Project No.	H1147164
Scale:	AS SHOWN
File No.	H1147164-1
Date:	9-17-14

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TOPOGRAPHIC VICINITY MAP
GROUNDWATER SAMPLING / TESTING
SUMMERPORT VILLAGE WATER MAIN RELOCATION
SUMMERPORT VILLAGE PARKWAY AND FICQUETTE ROAD
ORANGE COUNTY, FLORIDA

EXHIBIT
1



Project Mngr:	EK
Drawn By:	SW
Checked By:	EK
Approved By:	EK

Project No.	H1147164
Scale:	AS SHOWN
File No.	H1147164-2
Date:	9-17-14

Terracon
 Consulting Engineers and Scientists
 1675 LEE ROAD WINTER PARK, FLORIDA 32789
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TEMPORARY MONITORING WELL LOCATION
 GROUNDWATER SAMPLING / TESTING
 SUMMERPORT VILLAGE WATER MAIN RELOCATION
 SUMMERPORT VILLAGE PARKWAY AND FICQUETTE ROAD
 ORANGE COUNTY, FLORIDA

EXHIBIT
 2

APPENDIX B

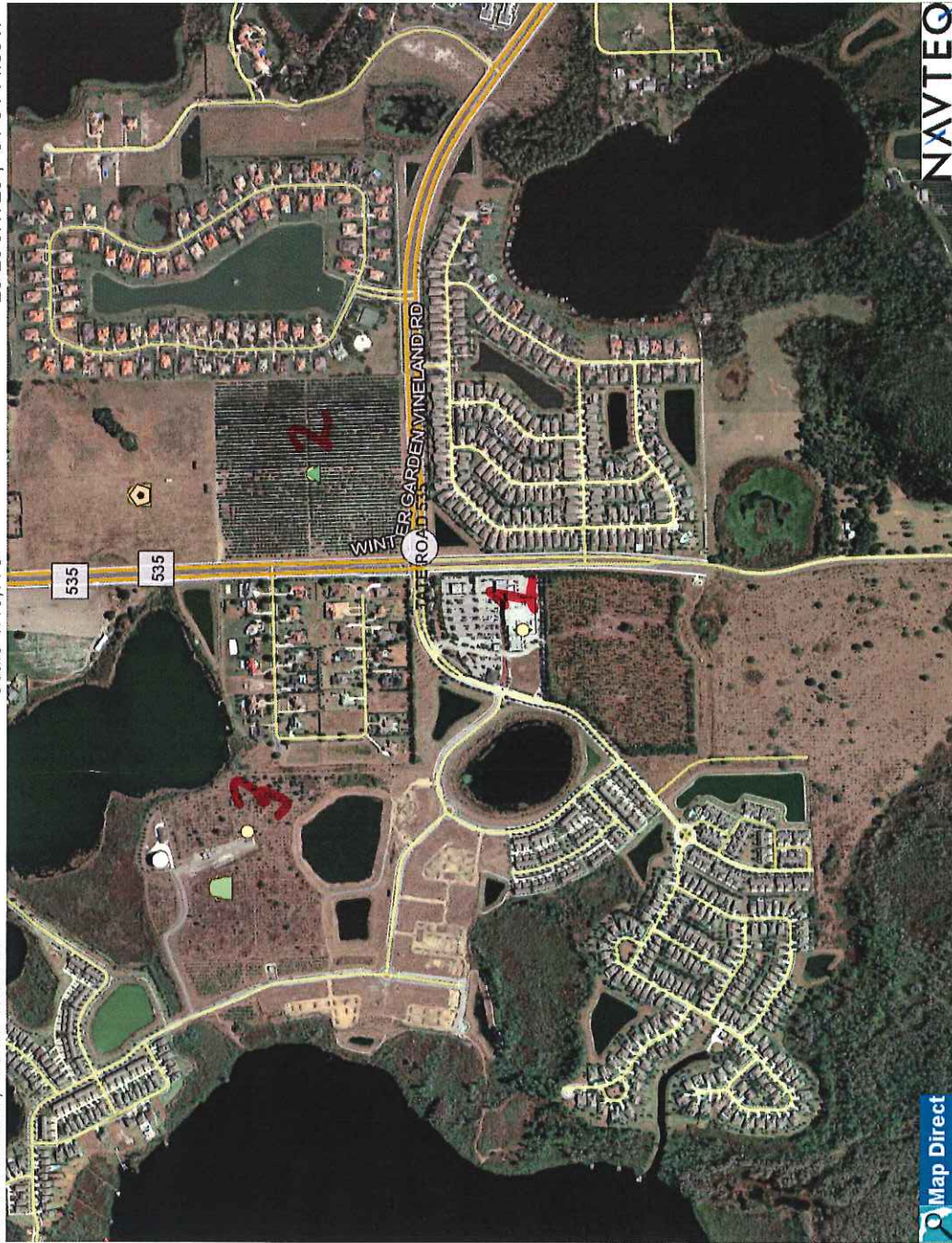


Map Direct: Water Data Central

28°29'10.7962", -81°35'48.5642"

Scale 1:13,778

28°29'9.1725", -81°34'14.3917"



28°28'6.9974", -81°35'49.9773"

1 inch = 1148 feet

28°28'5.3738", -81°34'15.8201"



- Aerial Imagery 2011-2013
- Registered Tanks from STCM
- Petroleum Contamination Monitoring (PCTS) from STCM Contaminations from STCM
- Drycleaning Solvent Program Cleanup Sites
- NPL and State Funded Waste Cleanup Sites
- State Funded Hazardous Waste Sites
- Superfund (NPL) Hazardous Waste Sites
- Solid Waste Facilities
- Facility
- General Disposal Area
- Waste Processing Area
- Storage Tank Contamination Monitoring (STCM)
- Retail Petroleum Facilities
- Large Quantity Generators (LQGs) from CHAZ IMS
- Small Quantity Generators (SQGs) from CHAZ IMS
- Brownfield Sites
- Counties
- Aerial Imagery Flight Dates 2011-2013
- DEP Cleanup Sites - Contamination Locator Map

Florida Department of Environmental Protection Disclaimer: This map created in Map Direct on Mon, 22 Sep 2014 18:44:42 UTC is intended for display purposes only. It was created using data from different sources collected at different scales, with different accuracies. The data provided in this map is for informational purposes only. NAVTEQ road data is provided "AS IS" and without warranties of any kind, either express or implied, including but not limited to accuracy, completeness, and suitability for any purpose, satisfactory quality and non-mismanagement. YOU SHOULD THEREFORE VERIFY ANY INFORMATION OBTAINED FROM THIS SITE BEFORE ACTING ON IT.

1 Public STCM 3 Orange Co. Utilities Hazardous West STCM
2 Orange Co. School Board - Hazardous West STCM

APPENDIX C

DEP-SOP-001/01
FT 1000 General Field Testing and Measurement

Form FD 9000-8: FIELD INSTRUMENT CALIBRATION RECORDS

INSTRUMENT (MAKE/MODEL#) YSI 556MPS **INSTRUMENT #** 06H2510AF

PARAMETER: [check only one]

- TEMPERATURE CONDUCTIVITY SALINITY pH ORP
 TURBIDITY RESIDUAL CI DO OTHER _____

STANDARDS: [Specify the type(s) of standards used for calibration, the origin of the standards, the standard values, and the date the standards were prepared or purchased]

Standard A Do 100%

Standard B PH 4, 7, 10

Standard C Conductivity 1413

DATE (yy/mm/dd)	TIME (hr:min)	STD (A, B, C)	STD VALUE	INSTRUMENT RESPONSE	% DEV	CALIBRATED (YES, NO)	TYPE (INIT, CONT)	SAMPLER INITIALS
11/18/08	1240	A	100	104/100	4%/<1	Yes	Init	ms
	1246	B	4	4.02	<1			
	1249	B	7	7.01	<1			
	1252	B	10	10.06	<1			
	1254	C	1413	1384/1413	2%/<1	Yes		
11/18/08	1340	A	100	100.5	<1	Yes	Cont	ms
	1343	B	4	4.02	<1			
	1346	B	7	7.01	<1			
	1349	B	10	10.05	<1			
	1351	C	1413	1413	<1			

DEP-SOP-001/01
FT 1000 General Field Testing and Measurement

Form FD 9000-8: FIELD INSTRUMENT CALIBRATION RECORDS

INSTRUMENT (MAKE/MODEL#) HACH 2100P **INSTRUMENT #** 08080C017245

PARAMETER: [check only one]

- TEMPERATURE CONDUCTIVITY SALINITY pH ORP
 TURBIDITY RESIDUAL CI DO OTHER _____

STANDARDS: [Specify the type(s) of standards used for calibration, the origin of the standards, the standard values, and the date the standards were prepared or purchased]

Standard A <0.1
 Standard B 20.0
 Standard C 100

DATE (yy/mm/dd)	TIME (hr:min)	STD (A, B, C)	STD VALUE	INSTRUMENT RESPONSE	% DEV	CALIBRATED (YES, NO)	TYPE (INIT, CONT)	SAMPLER INITIALS
11/19/08	1244	A	0.1	0.14	4%	Yes	Init	MA
	1245	B	20.0	19.9	<1			
	1246	C	100	99.5	<1			
14/9/08	1341	A	0.1	0.13	30%	Yes	Cont	MS
	1342	B	20.0	20.0	<1			
	1344	C	100	99.7	<1			

**Form FD 9000-24
GROUNDWATER SAMPLING LOG**

Risen Above Ground 0.8'

SITE NAME: <i>Summer Port Village</i>	SITE LOCATION: <i>Windermere, FL</i>
WELL NO: <i>TMU-1</i>	SAMPLE ID: <i>TMU-1</i> DATE: <i>9/8/14</i>

PURGING DATA

WELL DIAMETER (inches): <i>2"</i>	TUBING DIAMETER (inches): <i>3/16</i>	WELL SCREEN INTERVAL DEPTH: <i>8.2</i> feet to <i>18.2</i> feet	STATIC DEPTH TO WATER (feet): <i>9.28</i>	PURGE PUMP TYPE OR BAILER: <i>PP</i>							
WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY (only fill out if applicable)											
EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)											
INITIAL PUMP OR TUBING DEPTH IN WELL (feet): <i>14'</i>	FINAL PUMP OR TUBING DEPTH IN WELL (feet): <i>14'</i>	PURGING INITIATED AT: <i>1254</i>	PURGING ENDED AT: <i>1323</i>	TOTAL VOLUME PURGED (gallons): <i>2.37</i>							
TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) (mhos/cm or S/cm)	DISSOLVED OXYGEN (circle units) (mg/L or % saturation)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
<i>1315</i>	<i>1.71</i>	<i>1.71</i>	<i>0.11</i>	<i>11.26</i>	<i>7.23</i>	<i>21.98</i>	<i>437</i>	<i>21.0/123</i>	<i>5.07</i>	<i>Clear</i>	<i>None</i>
<i>1318</i>	<i>0.33</i>	<i>2.04</i>	<i>↓</i>	<i>11.26</i>	<i>7.23</i>	<i>22.08</i>	<i>434</i>	<i>21.3/137</i>	<i>7.24</i>	<i>"</i>	<i>"</i>
<i>1321</i>	<i>0.33</i>	<i>2.37</i>	<i>↓</i>	<i>11.26</i>	<i>7.24</i>	<i>22.14</i>	<i>431</i>	<i>21.4/186</i>	<i>9.54</i>	<i>"</i>	<i>"</i>
WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88 TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016 PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)											

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: <i>Mike Burns / Terracon</i>			SAMPLER(S) SIGNATURE(S): <i>[Signature]</i>			SAMPLING INITIATED AT: <i>1323</i>		SAMPLING ENDED AT: <i>1334</i>	
PUMP OR TUBING DEPTH IN WELL (feet):			TUBING MATERIAL CODE: <i>PE15</i>			FIELD-FILTERED: Y <input checked="" type="checkbox"/>		FILTER SIZE: _____ m	
FIELD DECONTAMINATION: PUMP Y <input checked="" type="checkbox"/>			TUBING Y <input checked="" type="checkbox"/> (replaced)			DUPLICATE: Y <input checked="" type="checkbox"/>			
SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
<i>TMU-1</i>	<i>3</i>	<i>CG</i>	<i>40mL</i>	<i>HCL</i>	<i>-</i>	<i>-</i>	<i>BZG Benz/NAIP</i>	<i>RFP</i>	<i>2/100 mL</i>
	<i>2</i>	<i>AG</i>	<i>40mL</i>	<i>HCL</i>	<i>-</i>	<i>-</i>	<i>TOC</i>	<i>↓</i>	<i>↓</i>
	<i>2</i>	<i>AG</i>	<i>1Ltr.</i>	<i>H2SO4</i>	<i>-</i>	<i>-</i>	<i>FL-PRO</i>	<i>APP</i>	<i>0.11 GPM</i>
	<i>1</i>	<i>PE</i>	<i>250mL</i>	<i>HNO3</i>	<i>-</i>	<i>-</i>	<i>metals</i>	<i> </i>	<i> </i>
	<i>1</i>	<i>PE</i>	<i>500mL</i>	<i>None</i>	<i>-</i>	<i>-</i>	<i>XCR, PH</i>	<i> </i>	<i> </i>
	<i>1</i>	<i>AG</i>	<i>50mL</i>	<i>None</i>	<i>-</i>	<i>-</i>	<i>LLHG</i>	<i> </i>	<i>↓</i>
REMARKS:									
MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)									
SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)									

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)
pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

APPENDIX D

Accutest Laboratories Southeast, Inc.		Sep 16, 2014 16:19 pm
Job Number:	FA18071	
Account:	Terracon Consulting	
Project:	Summerport Village WM Replacement; Windermere, FL	
Project Number:	H1147164	
Legend:		Hit
Client Sample ID:		TMW-2
Lab Sample ID:		FA18071-1
Date Sampled:		09/08/2014
Matrix:		Ground Water
GC/MS Volatiles (SW846 8260B)		
Benzene	ug/l	0.24 U
Naphthalene	ug/l	1.2 l
GC Semi-volatiles (FLORIDA-PRO)		
TPH (C8-C40)	mg/l	0.182 l
Metals Analysis		
Cadmium	ug/l	0.50 U
Calcium	ug/l	51400
Copper	ug/l	1.0 U
Lead	ug/l	1.1 U
Magnesium	ug/l	8870
Mercury	ng/l	8.2 ^a
Zinc	ug/l	7.6 l
General Chemistry		
Chromium, Hexavalent	mg/l	0.0080 U
Hardness, Total as CaCO ₃	mg/l	165 ^b
Total Organic Carbon	mg/l	5.8
pH	su	5.91 ^c
Footnotes:		
^a Analysis performed at Accutest Laboratories, Dayton, NJ.		
^b Calculated as: (Calcium * 2.497) + (Magnesium * 4.118)		
^c Field analysis required. Received out of hold time and analyzed by request.		

Technical Report for

Terracon Consulting

Summerport Village WM Replacement; Windermere, FL

H1147164

Accutest Job Number: FA18071

Sampling Date: 09/08/14

Report to:

**Terracon
1675 Lee Rd
Winter Park, FL 32789
erkrebill@terracon.com**

ATTN: Eric Krebill

Total number of pages in report: 40



Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Program and/or state specific certification programs as applicable.



**Norm Farmer
Technical Director**

Client Service contact: Andrea Colby 407-425-6700

Certifications: FL (E83510), LA (03051), KS (E-10327), IA (366), IL (200063), NC (573), NJ (FL002), SC (96038001)
DoD ELAP (L-A-B L2229), CA (04226CA), TX (T104704404), PA (68-03573), VA (460177),
AK, AR, GA, KY, MA, NV, OK, UT, WA

This report shall not be reproduced, except in its entirety, without the written approval of Accutest Laboratories.
Test results relate only to samples analyzed.

Table of Contents

-1-

Section 1: Sample Summary	3
Section 2: Summary of Hits	4
Section 3: Sample Results	5
3.1: FA18071-1: TMW-2	6
Section 4: Misc. Forms	10
4.1: Chain of Custody	11
Section 5: GC/MS Volatiles - QC Data Summaries	13
5.1: Method Blank Summary	14
5.2: Blank Spike Summary	15
5.3: Matrix Spike/Matrix Spike Duplicate Summary	16
Section 6: GC Semi-volatiles - QC Data Summaries	17
6.1: Method Blank Summary	18
6.2: Blank Spike Summary	19
6.3: Matrix Spike/Matrix Spike Duplicate Summary	20
Section 7: Metals Analysis - QC Data Summaries	21
7.1: Prep QC MP27848: Cd,Ca,Cu,Pb,Mg,Zn	22
Section 8: General Chemistry - QC Data Summaries	28
8.1: Method Blank and Spike Results Summary	29
8.2: Duplicate Results Summary	30
8.3: Matrix Spike Results Summary	31
8.4: Matrix Spike Duplicate Results Summary	32
Section 9: Misc. Forms (Accutest New Jersey)	33
9.1: Chain of Custody	34
Section 10: Metals Analysis - QC Data (Accutest New Jersey)	36
10.1: Prep QC MP81926: Hg	37

1

2

3

4

5

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Sample Summary

Terracon Consulting

Job No: FA18071

Summerport Village WM Replacement; Windermere, FL
Project No: H1147164

Sample Number	Collected		Matrix			Client Sample ID
	Date	Time By	Received	Code	Type	
FA18071-1	09/08/14	13:23 MB	09/08/14	AQ	Ground Water	TMW-2

Summary of Hits

Job Number: FA18071
Account: Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL
Collected: 09/08/14

Lab Sample ID	Client Sample ID	Result/ Qual	PQL	MDL	Units	Method
FA18071-1	TMW-2					
Naphthalene		1.2 I	5.0	1.0	ug/l	SW846 8260B
TPH (C8-C40)		0.182 I	0.24	0.14	mg/l	FLORIDA-PRO
Calcium		51400	1000	50	ug/l	SW846 6010C
Magnesium		8870	5000	56	ug/l	SW846 6010C
Mercury ^a		8.2	0.50	0.42	ng/l	EPA 1631
Zinc		7.6 I	20	3.0	ug/l	SW846 6010C
Hardness, Total as CaCO ₃ ^b		165	23	0.36	mg/l	SM19 2340B
Total Organic Carbon		5.8	1.0	0.23	mg/l	SM5310 B-11/SW9060A
pH ^c		5.91			su	SM4500H B-11/SW9040C

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

(b) Calculated as: (Calcium * 2.497) + (Magnesium * 4.118)

(c) Field analysis required. Received out of hold time and analyzed by request.

Sample Results

Report of Analysis

Report of Analysis

Client Sample ID: TMW-2		
Lab Sample ID: FA18071-1		Date Sampled: 09/08/14
Matrix: AQ - Ground Water		Date Received: 09/08/14
Method: SW846 8260B		Percent Solids: n/a
Project: Summerport Village WM Replacement; Windermere, FL		

Run #	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	M77185.D	1	09/11/14	RB	n/a	n/a	VM3266
Run #2							

Run #	Purge Volume
Run #1	5.0 ml
Run #2	

CAS No.	Compound	Result	PQL	MDL	Units	Q
71-43-2	Benzene	0.24 U	1.0	0.24	ug/l	
91-20-3	Naphthalene	1.2	5.0	1.0	ug/l	I

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		83-118%
17060-07-0	1,2-Dichloroethane-D4	98%		79-125%
2037-26-5	Toluene-D8	101%		85-112%
460-00-4	4-Bromofluorobenzene	103%		83-118%

U = Not detected MDL = Method Detection Limit
 PQL = Practical Quantitation Limit
 L = Indicates value exceeds calibration range

I = Result > = MDL but < PQL J = Estimated value
 V = Indicates analyte found in associated method blank
 N = Indicates presumptive evidence of a compound

Report of Analysis

3.1
3

Client Sample ID: TMW-2		Date Sampled: 09/08/14
Lab Sample ID: FA18071-1		Date Received: 09/08/14
Matrix: AQ - Ground Water		Percent Solids: n/a
Method: FLORIDA-PRO SW846 3510C		
Project: Summerport Village WM Replacement; Windermere, FL		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	LL56502.D	1	09/10/14	FEA	09/09/14	OP53021	GLL2082
Run #2							

	Initial Volume	Final Volume
Run #1	1060 ml	1.0 ml
Run #2		

CAS No.	Compound	Result	PQL	MDL	Units	Q
	TPH (C8-C40)	0.182	0.24	0.14	mg/l	I
CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits		
84-15-1	o-Terphenyl	97%		43-123%		

U = Not detected MDL = Method Detection Limit I = Result > = MDL but < PQL J = Estimated value
 PQL = Practical Quantitation Limit V = Indicates analyte found in associated method blank
 L = Indicates value exceeds calibration range N = Indicates presumptive evidence of a compound

Report of Analysis

3.1
3

Client Sample ID: TMW-2	
Lab Sample ID: FA18071-1	Date Sampled: 09/08/14
Matrix: AQ - Ground Water	Date Received: 09/08/14
	Percent Solids: n/a
Project: Summerport Village WM Replacement; Windermere, FL	

Total Metals Analysis

Analyte	Result	PQL	MDL	Units	DF	Prep	Analyzed By	Method	Prep Method
Cadmium	0.50 U	5.0	0.50	ug/l	1	09/10/14	09/10/14 LM	SW846 6010C ¹	SW846 3010A ³
Calcium	51400	1000	50	ug/l	1	09/10/14	09/10/14 LM	SW846 6010C ¹	SW846 3010A ³
Copper	1.0 U	25	1.0	ug/l	1	09/10/14	09/10/14 LM	SW846 6010C ¹	SW846 3010A ³
Lead	1.1 U	5.0	1.1	ug/l	1	09/10/14	09/10/14 LM	SW846 6010C ¹	SW846 3010A ³
Magnesium	8870	5000	56	ug/l	1	09/10/14	09/10/14 LM	SW846 6010C ¹	SW846 3010A ³
Mercury ^a	8.2	0.50	0.42	ng/l	1	09/11/14	09/15/14 ANJ	EPA 1631 ²	EPA 1631 ⁴
Zinc	7.6 I	20	3.0	ug/l	1	09/10/14	09/10/14 LM	SW846 6010C ¹	SW846 3010A ³

(1) Instrument QC Batch: MA11876

(2) Instrument QC Batch: N:MA34930

(3) Prep QC Batch: MP27848

(4) Prep QC Batch: N:MP81926

(a) Analysis performed at Accutest Laboratories, Dayton, NJ.

PQL = Practical Quantitation Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
I = Indicates a result > = MDL but < PQL

Report of Analysis

Client Sample ID: TMW-2	Date Sampled: 09/08/14
Lab Sample ID: FA18071-1	Date Received: 09/08/14
Matrix: AQ - Ground Water	Percent Solids: n/a
Project: Summerport Village WM Replacement; Windermere, FL	

General Chemistry

Analyte	Result	PQL	MDL	Units	DF	Analyzed	By	Method
Chromium, Hexavalent	0.0080 U	0.010	0.0080	mg/l	1	09/08/14 15:30	JC	SW846 7196A
Hardness, Total as CaCO ₃ ^a	165	23	0.36	mg/l	1	09/10/14 16:00	LM	SM19 2340B
Total Organic Carbon	5.8	1.0	0.23	mg/l	1	09/09/14 18:58	FN	SM5310 B-11/SW9060A
pH ^b	5.91			su	1	09/08/14 15:30	JA	SM4500H B-11/SW9040C

(a) Calculated as: (Calcium * 2.497) + (Magnesium * 4.118)

(b) Field analysis required. Received out of hold time and analyzed by request.

PQL = Practical Quantitation Limit
MDL = Method Detection Limit

U = Indicates a result < MDL
I = Indicates a result > = MDL but < PQL

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody



Accutest Laboratories Southeast Chain of Custody

4405 Vineland Road, Suite C-15 Orlando, FL 32811
TEL. 407-425-6700 • FAX: 407-425-0707
www.accutest.com

FA18071

Accutest Job # _____ PAGE 1 OF 1

Accutest Quote # _____ SKIFF# _____

Client / Reporting Information		Project Information		Analytical Information												Matrix Codes	
Company Name <u>Terracon</u>		Project Name: <u>Summerport Village WM Replacement</u>		<div style="display: flex; flex-direction: column; align-items: center; gap: 10px;"> <p>8260 ATEX + MAP</p> <p>TOC</p> <p>FL-PRO</p> <p>XCR, PH</p> <p>Col, Cu, Pb, Zn, Hg, Seals</p> <p>LL Hg</p> </div>												DW - Drinking Water GW - Ground Water WW - Water SW - Surface Water SO - Soil SL - Sludge OL - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe	
Address <u>1675 Lee Rd.</u>		Street _____															
City <u>Winderbar</u> State <u>FL</u> Zip <u>32783</u>		City <u>Winderbar</u> State <u>FL</u>															
Project Contact <u>Eric Krebill</u> E-mail <u>ekreibill@terracon.com</u>		Project # <u>H1147164</u>															
Phone # <u>407-758-9651</u>		Fax # <u>407-740-6112</u>															
Sampler(s) Name(s) (Printed) <u>Mike Burns</u>		Client Purchase Order # _____															

Accutest Sample #	Field ID / Point of Collection	COLLECTION		CONTAINER INFORMATION													LAB USE ONLY											
		DATE	TIME	SAMPLED BY	MATRIX	TOTAL # OF BOTTLES	OTHER	NOVIE	PHI	NICH	PHOS	RESO4	NO3-N/20MG	DI WATER	BIOSH													
1	Tmw-2	9/18/14	1323	MB	GIW	10		X	X		X	X						X	X	X	X	X	X					

TURNAROUND TIME (Business Days)		Data Deliverable Information		Comments / Remarks		
<input type="checkbox"/> 10 Days Standard <input type="checkbox"/> 7 Day RUSH <input type="checkbox"/> 5 Day RUSH <input type="checkbox"/> 3 Day EMERGENCY <input type="checkbox"/> 2 Day EMERGENCY <input type="checkbox"/> 1 Day EMERGENCY <input type="checkbox"/> OTHER	Approved By: / Rush Code <u>Go day TAT</u>	<input type="checkbox"/> COMMERCIAL "A" (RESULTS ONLY) <input type="checkbox"/> COMMERCIAL "B" (RESULTS PLUS QC) <input type="checkbox"/> REDT1 (EPA LEVEL 3) <input type="checkbox"/> FULT1 (EPA LEVEL 4) <input type="checkbox"/> EDD'S				

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler: <u>[Signature]</u>	Date Time: <u>9/18/14 1940</u>	Received By: <u>[Signature]</u>	Relinquished by:	Date Time:	Received By:
1		2	3		4
Relinquished by:	Date Time:	Received By:	Relinquished by:	Date Time:	Received By:
5		6	7		8

Lab Use Only: Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved where Applicable: Y N Total # of Coolers: _____ Cooler Temperature (s) Celsius: _____

4.1
4

FA18071: Chain of Custody

Page 1 of 2

ACCUTEST LABORATORIES SAMPLE RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: FA18071 CLIENT: Terracore PROJECT: Summer port Village
 DATE/TIME RECEIVED: 09-08-14 1440 (MM/DD/YY 24:00) NUMBER OF COOLERS RECEIVED: 1
 METHOD OF DELIVERY: FEDEX UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER
 AIRBILL NUMBERS: _____

COOLER INFORMATION

- CUSTODY SEAL NOT PRESENT OR NOT INTACT
- CHAIN OF CUSTODY NOT RECEIVED (COC)
- ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- TEMPERATURE CRITERIA NOT MET

TRIP BLANK INFORMATION

- TRIP BLANK PROVIDED
- TRIP BLANK NOT PROVIDED
- TRIP BLANK NOT ON COC
- TRIP BLANK INTACT
- TRIP BLANK NOT INTACT
- RECEIVED WATER TRIP BLANK
- RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES ? 25-GRAM _____ 5-GRAM _____
 NUMBER OF 5035 FIELD KITS ? _____
 NUMBER OF LAB FILTERED METALS ? _____

TEMPERATURE INFORMATION

IR THERM ID 1 CORR. FACTOR 104
 OBSERVED TEMPS: 27
 CORRECTED TEMPS: 32

SAMPLE INFORMATION

- INCORRECT NUMBER OF CONTAINERS USED
- SAMPLE RECEIVED IMPROPERLY PRESERVED
- INSUFFICIENT VOLUME FOR ANALYSIS
- DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- ID'S ON COC DO NOT MATCH LABEL
- VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- SAMPLE CONTAINER(S) RECEIVED BROKEN
- 5035 FIELD KITS NOT RECEIVED WITHIN 48 HOURS
- BULK VOA SOIL JARS NOT RECEIVED WITHIN 48 HOURS
- % SOLIDS JAR NOT RECEIVED
- RESIDUAL CHLORINE PRESENT

{ APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS }

SUMMARY OF COMMENTS: _____

TECHNICIAN SIGNATURE/DATE RWille 090814 REVIEWER SIGNATURE/DATE _____

RS 04/14

receipt confirmation 041514.xls

GC/MS Volatiles

5

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA18071
Account: TERCFLWP Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM3266-MB	M77169.D	1	09/11/14	RB	n/a	n/a	VM3266

The QC reported here applies to the following samples:

Method: SW846 8260B

FA18071-1

CAS No.	Compound	Result	RL	MDL	Units	Q
71-43-2	Benzene	ND	1.0	0.24	ug/l	
91-20-3	Naphthalene	ND	5.0	1.0	ug/l	

CAS No.	Surrogate Recoveries	Limits	
1868-53-7	Dibromofluoromethane	99%	83-118%
17060-07-0	1,2-Dichloroethane-D4	100%	79-125%
2037-26-5	Toluene-D8	101%	85-112%
460-00-4	4-Bromofluorobenzene	102%	83-118%

CAS No.	Tentatively Identified Compounds	R.T.	Est. Conc.	Units	Q
105-39-5	Acetic acid, chloro-, ethyl ester	4.37	140	ug/l	JN
	Total TIC, Volatile		140	ug/l	J

5.1.1
5

Blank Spike Summary

Job Number: FA18071
Account: TERCFLWP Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VM3266-BS	M77167.D	1	09/11/14	RB	n/a	n/a	VM3266

The QC reported here applies to the following samples:

Method: SW846 8260B

FA18071-1

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
71-43-2	Benzene	25	26.9	108	81-122
91-20-3	Naphthalene	25	26.7	107	63-132

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	98%	83-118%
17060-07-0	1,2-Dichloroethane-D4	104%	79-125%
2037-26-5	Toluene-D8	100%	85-112%
460-00-4	4-Bromofluorobenzene	99%	83-118%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA18071
Account: TERCFLWP Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA18023-16MS	M77186.D	10	09/11/14	RB	n/a	n/a	VM3266
FA18023-16MSD	M77187.D	10	09/11/14	RB	n/a	n/a	VM3266
FA18023-16	M77184.D	10	09/11/14	RB	n/a	n/a	VM3266

The QC reported here applies to the following samples:

Method: SW846 8260B

FA18071-1

CAS No.	Compound	FA18023-16 ug/l	Spike Q ug/l	MS ug/l	MS %	Spike ug/l	MSD ug/l	MSD %	RPD	Limits Rec/RPD
71-43-2	Benzene	271	250	528	103	250	515	98	2	81-122/14
91-20-3	Naphthalene	134	250	360	90	250	394	104	9	63-132/25

CAS No.	Surrogate Recoveries	MS	MSD	FA18023-16	Limits
1868-53-7	Dibromofluoromethane	98%	99%	95%	83-118%
17060-07-0	1,2-Dichloroethane-D4	100%	100%	98%	79-125%
2037-26-5	Toluene-D8	101%	102%	102%	85-112%
460-00-4	4-Bromofluorobenzene	98%	99%	101%	83-118%

* = Outside of Control Limits.

5.3.1
 5

GC Semi-volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA18071
Account: TERCFLWP Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP53021-MB	LL56478.D	1	09/10/14	FEA	09/09/14	OP53021	GLL2082

The QC reported here applies to the following samples:

Method: FLORIDA-PRO

FA18071-1

CAS No.	Compound	Result	RL	MDL	Units	Q
	TPH (C8-C40)	ND	0.25	0.15	mg/l	

CAS No.	Surrogate Recoveries	Limits
84-15-1	o-Terphenyl	93% 43-123%

6.1.1

6

Blank Spike Summary

Job Number: FA18071
Account: TERCFLWP Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP53021-BS	LL56477.D	1	09/09/14	FEA	09/09/14	OP53021	GLL2082

The QC reported here applies to the following samples:

Method: FLORIDA-PRO

FA18071-1

CAS No.	Compound	Spike mg/l	BSP mg/l	BSP %	Limits
	TPH (C8-C40)	0.85	0.715	84	48-113

CAS No.	Surrogate Recoveries	BSP	Limits
84-15-1	o-Terphenyl	84%	43-123%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA18071
Account: TERCFLWP Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
OP53021-MS	LL56480.D	1	09/10/14	FEA	09/09/14	OP53021	GLL2082
OP53021-MSD	LL56481.D	1	09/10/14	FEA	09/09/14	OP53021	GLL2082
FA17996-9	LL56479.D	1	09/10/14	FEA	09/09/14	OP53021	GLL2082

The QC reported here applies to the following samples:

Method: FLORIDA-PRO

FA18071-1

CAS No.	Compound	FA17996-9 mg/l	Spike Q mg/l	MS mg/l	MS %	Spike mg/l	MSD mg/l	MSD %	RPD	Limits Rec/RPD
	TPH (C8-C40)	0.24 U	0.802	0.712	89	0.802	0.681	85	4	48-113/27

CAS No.	Surrogate Recoveries	MS	MSD	FA17996-9	Limits
84-15-1	o-Terphenyl	94%	93%	80%	43-123%

* = Outside of Control Limits.

Metals Analysis

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: FA18071
Account: TERCFLWP - Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP27848
Matrix Type: AQUEOUS

Methods: SW846 6010C
Units: ug/l

Prep Date: 09/10/14

Metal	RL	IDL	MDL	MB raw	final
Aluminum	200	15	15		
Antimony	6.0	2	2.3		
Arsenic	10	2	2.4		
Barium	200	1	1		
Beryllium	4.0	.5	.5		
Cadmium	5.0	.5	.5	-0.10	<5.0
Calcium	1000	50	50	8.8	<1000
Chromium	10	1	2		
Cobalt	50	.5	.5		
Copper	25	1	1	-1.2	<25
Iron	300	17	17		
Lead	5.0	1.1	1.1	-0.20	<5.0
Magnesium	5000	50	56	25.4	<5000
Manganese	15	.5	1		
Molybdenum	50	.5	.5		
Nickel	40	.5	.5		
Potassium	10000	200	200		
Selenium	10	2.3	2.3		
Silver	10	.65	.77		
Sodium	10000	500	500		
Strontium	10	.4	.4		
Thallium	10	1.5	2		
Tin	50	.7	1		
Titanium	10	.9	1		
Vanadium	50	.5	.5		
Zinc	20	3	3	7.3	<20

Associated samples MP27848: FA18071-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

7.1.1
7

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA18071
 Account: TERCFLWP - Terracon Consulting
 Project: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP27848
 Matrix Type: AQUEOUS

Methods: SW846 6010C
 Units: ug/l

Prep Date: 09/10/14 09/10/14

Metal	FA18071-1 Original	DUP	RPD	QC Limits	FA18071-1 Original MS	Spikelot MPFLICP2	% Rec	QC Limits	
Aluminum	anr								
Antimony									
Arsenic									
Barium									
Beryllium									
Cadmium	0.0	0.0	NC	0-20	0.0	47.7	50	95.4	80-120
Calcium	51400	50500	1.8	0-20	51400	73300	25000	87.6	80-120
Chromium	anr								
Cobalt									
Copper	0.0	0.0	NC	0-20	0.0	249	250	99.6	80-120
Iron	anr								
Lead	0.0	0.0	NC	0-20	0.0	476	500	95.2	80-120
Magnesium	8870	8710	1.8	0-20	8870	32500	25000	94.5	80-120
Manganese	anr								
Molybdenum	anr								
Nickel	anr								
Potassium									
Selenium									
Silver									
Sodium									
Strontium									
Thallium									
Tin									
Titanium									
Vanadium									
Zinc	7.6	7.6	0.0	0-20	7.6	484	500	95.3	80-120

Associated samples MP27848: FA18071-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

7.1.2
 7

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA18071
 Account: TERCFLWP - Terracon Consulting
 Project: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP27848
 Matrix Type: AQUEOUS

Methods: SW846 6010C
 Units: ug/l

Prep Date: 09/10/14

Metal	FA18071-1 Original MSD	SpikeLot MPFLICP2 % Rec	MSD RPD	QC Limit
Aluminum	anr			
Antimony				
Arsenic				
Barium				
Beryllium				
Cadmium	0.0 48.5	50 97.0	1.7	20
Calcium	51400 75200	25000 95.2	2.6	20
Chromium	anr			
Cobalt				
Copper	0.0 253	250 101.2	1.6	20
Iron	anr			
Lead	0.0 482	500 96.4	1.3	20
Magnesium	8870 33400	25000 98.1	2.7	20
Manganese	anr			
Molybdenum	anr			
Nickel	anr			
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc	7.6 493	500 97.1	1.8	20

Associated samples MP27848: FA18071-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (N) Matrix Spike Rec. outside of QC limits
 (anr) Analyte not requested

7.1.2
7

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: FA18071
 Account: TERCFLWP - Terracon Consulting
 Project: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP27848
 Matrix Type: AQUEOUS

Methods: SW846 6010C
 Units: ug/l

Prep Date: 09/10/14

Metal	BSP Result	Spikelot MPFLICP2	% Rec	QC Limits
Aluminum	anr			
Antimony				
Arsenic				
Barium				
Beryllium				
Cadmium	47.6	50	95.2	80-120
Calcium	26100	25000	104.4	80-120
Chromium	anr			
Cobalt				
Copper	254	250	101.6	80-120
Iron	anr			
Lead	473	500	94.6	80-120
Magnesium	25800	25000	103.2	80-120
Manganese	anr			
Molybdenum	anr			
Nickel	anr			
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc	496	500	99.2	80-120

Associated samples MP27848: FA18071-1

Results < IDL are shown as zero for calculation purposes
 (*) Outside of QC limits
 (anr) Analyte not requested

7.1.3
7

SERIAL DILUTION RESULTS SUMMARY

Login Number: FA18071
 Account: TERCFLWP - Terracon Consulting
 Project: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP27848
 Matrix Type: AQUEOUS

Methods: SW846 6010C
 Units: ug/l

Prep Date: 09/10/14

Metal	FA18071-1 Original	SDL 1:5	%DIF	QC Limits
Aluminum	anr			
Antimony				
Arsenic				
Barium				
Beryllium				
Cadmium	0.00	0.00	NC	0-10
Calcium	51400	51400	0.1	0-10
Chromium	anr			
Cobalt				
Copper	0.00	0.00	NC	0-10
Iron	anr			
Lead	0.00	0.00	NC	0-10
Magnesium	8870	8920	0.6	0-10
Manganese	anr			
Molybdenum	anr			
Nickel	anr			
Potassium				
Selenium				
Silver				
Sodium				
Strontium				
Thallium				
Tin				
Titanium				
Vanadium				
Zinc	7.60	0.00	100.0(a)	0-10

Associated samples MP27848: FA18071-1

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

(a) Percent difference acceptable due to low initial sample concentration (< 50 times IDL).

7.1.4
7

POST DIGESTATE SPIKE SUMMARY

Login Number: FA18071
 Account: TERCFLWP - Terracon Consulting
 Project: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP27848
 Matrix Type: AQUEOUS

Methods: SW846 6010C
 Units: ug/l

Prep Date:

09/10/14

Metal	Sample ml	Final ml	FA18071-1 Raw	FA18071-1 Corr.**	PS ug/l	Spike ml	Spike ug/ml	Spike ug/l	% Rec	QC Limits
Aluminum										
Antimony										
Arsenic										
Barium										
Beryllium										
Cadmium	9.8	10			53.9	0.2	2.5	50	107.8	80-120
Calcium	9.8	10	51370	50342.6	54000	0.2	250	5000	73.1*(a)	80-120
Chromium										
Cobalt										
Copper	9.8	10			107.9	0.2	5	100	107.9	80-120
Iron										
Lead	9.8	10			51	0.2	2.5	50	102.0	80-120
Magnesium	9.8	10	8865	8687.7	13320	0.2	250	5000	92.6	80-120
Manganese										
Molybdenum										
Nickel										
Potassium										
Selenium										
Silver										
Sodium										
Strontium										
Thallium										
Tin										
Titanium										
Vanadium										
Zinc	9.8	10	7.6	7.448	272.4	0.2	12.5	250	106.0	80-120

Associated samples MP27848: FA18071-1

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(**) Corr. sample result = Raw * (sample volume / final volume)

(anr) Analyte not requested

(a) Spike recovery indicates matrix interference and/or outside control limits due to high level in sample relative to spike amount.

General Chemistry

QC Data Summaries

Includes the following where applicable:

- Method Blank and Blank Spike Summaries
- Duplicate Summaries
- Matrix Spike Summaries

METHOD BLANK AND SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA18071
Account: TERCFLWP - Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Analyte	Batch ID	RL	MB Result	Units	Spike Amount	BSP Result	BSP %Recov	QC Limits
Chromium, Hexavalent	GN63067	0.010	0.0	mg/l	0.100	0.094	94.3	85-115%
Total Organic Carbon	GP24619/GN63089	1.0	0.0	mg/l	15	16.4	109.3	90-110%

Associated Samples:
Batch GN63067: FA18071-1
Batch GN63068: FA18071-1
Batch GP24619: FA18071-1
(*) Outside of QC limits

DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA18071
Account: TERCFLWP - Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Analyte	Batch ID	QC Sample	Units	Original Result	DUP Result	RPD	QC Limits
Total Organic Carbon	GP24619/GN63089	FA18004-14	mg/l	0.64	0.68	6.1	0-20%
pH	GN63068	FA18071-1	su	5.91	5.89	0.3	0-10%

Associated Samples:
Batch GN63068: FA18071-1
Batch GP24619: FA18071-1
(*) Outside of QC limits

8.2
8

MATRIX SPIKE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA18071
Account: TERCFLWP - Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MS Result	%Rec	QC Limits
Chromium, Hexavalent	GN63067	FA18071-1	mg/l	0.0080 U	0.100	0.090	89.9	85-115%
Total Organic Carbon	GP24619/GN63089	FA18004-14	mg/l	0.64	15	19.6	126.4N(a)	90-110%

Associated Samples:

Batch GN63067: FA18071-1

Batch GP24619: FA18071-1

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(a) Spike recovery indicates possible matrix interference.



MATRIX SPIKE DUPLICATE RESULTS SUMMARY
GENERAL CHEMISTRY

Login Number: FA18071
Account: TERCFLWP - Terracon Consulting
Project: Summerport Village WM Replacement; Windermere, FL

Analyte	Batch ID	QC Sample	Units	Original Result	Spike Amount	MSD Result	RPD	QC Limit
Chromium, Hexavalent	GN63067	FA18071-1	mg/l	0.0080 U	0.100	0.092	2.6	20%

Associated Samples:

Batch GN63067: FA18071-1

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

Misc. Forms

Custody Documents and Other Forms

(Accutest New Jersey)

Includes the following where applicable:

- Chain of Custody

4405 Vineland Rd, Suite C-15, Orlando, FL 32811
TEL: 407-425-6700 FAX: 407-425-0707
www.accutest.com

Client / Reporting Information Company Name: Accutest Laboratories Street Address: 4405 Vineland Rd, Suite C-15 City: Orlando State: FL Zip: 32811 Project Contact: andrea@accutest.com E-mail: andrea@accutest.com Phone #: 407-425-6700 Fax #: _____ Client Purchase Order #: _____ Sample(s) Name(s): MB Phone: _____ Project Manager: _____		Project Information Project Name: Summerport Village WM Replacement, Windermere, FL Street: _____ Billing Information (if different from Report to) Company Name: _____ Project #: _____ Street Address: _____ City: _____ State: _____ Zip: _____ Attention: _____		FED-EX Tracking # 612727499300 Bottle Order Control # _____ Accutest Quote # _____ Accutest Job # FA18071							
Requested Analysis (see TEST CODE sheet)		Matrix Codes DW - Drinking Water GW - Ground Water WW - Water SW - Surface Water SO - Soil SL - Sludge SED - Sediment OI - Oil LIQ - Other Liquid AIR - Air SOL - Other Solid WP - Wipe FB - Field Blank EB - Equipment Blank RB - Rinse Blank TB - Trip Blank		LAB USE ONLY <i>HPUK</i>							
Accutest Sample # 1	Field ID / Point of Collection TMW-2	MEQ/MDI Vial # _____	Date 9/8/14	Time 1:23:00 PM	Sampled by MB	Matrix AQ	# of bottles 1	Number of preserved bottles HDI _____ NHD _____ HND _____ HSDA _____ NONE _____ DI Water _____ MESH _____ ENCORE _____	HGLL 1631 X	1	HPUK
Turnaround Time (Business days) <input type="checkbox"/> 10 Day (business) <input type="checkbox"/> 5-7 Day <input type="checkbox"/> 3 Day RUSH <input type="checkbox"/> 2 Day RUSH <input type="checkbox"/> 1 Day RUSH <input checked="" type="checkbox"/> other <u>7</u> <small>Rush T/A data available via Lablink</small>		Approved By (Accutest PM): / Date: _____		Data Deliverable Information <input type="checkbox"/> Commercial "A" (Level 1, Results Only) <input type="checkbox"/> Commercial "B" (Level 2, Results + QC summary) <input type="checkbox"/> REDT1 (Level 3) <input type="checkbox"/> FULT1 (Level 4) <input type="checkbox"/> DOD FULT1 (Level 4) <input checked="" type="checkbox"/> Other <u>COMMB</u> <input type="checkbox"/> EDD Format _____		Comments / Special Instructions ALNJ					
Sample Custody must be documented below each time samples change possession, including courier delivery.											
Relinquished by Sampler: <i>[Signature]</i>	Date Time: 09-09-14 1700	Received By: FO	Relinquished By: FO	Date Time: 9/10/14 1000	Received By: <i>[Signature]</i>						
Relinquished by Sampler: 3	Date Time:	Received By: 3	Relinquished By: 4	Date Time:	Received By: 4						
Relinquished by: 5	Date Time:	Received By: 5	Custody Seal # N/A	<input type="checkbox"/> Intact <input type="checkbox"/> Not intact	<input type="checkbox"/> Preserved where applicable	<input type="checkbox"/> On Ice <input type="checkbox"/> Cooler Temp.	2.56				

9.1
9

FA18071: Chain of Custody
Page 1 of 2
Accutest New Jersey



Accutest Laboratories Sample Receipt Summary

Accutest Job Number: FA18071 Client: _____ Project: _____
 Date / Time Received: 9/10/2014 Delivery Method: _____ Airbill #'s: _____

Cooler Temps (Initial/Adjusted): #1: (2.5/2.5); 0

<u>Cooler Security</u>	<u>Y</u>	<u>or</u>	<u>N</u>		<u>Y</u>	<u>or</u>	<u>N</u>
1. Custody Seals Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	3. COC Present:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Custody Seals Intact:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	4. Smpl Dates/Time OK	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Cooler Temperature</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Temp criteria achieved:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Cooler temp verification:	IR Gun		
3. Cooler media:	Ice (Bag)		
4. No. Coolers:	1		

<u>Quality Control Preservatio</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Trip Blank present / cooler:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
2. Trip Blank listed on COC:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Samples preserved properly:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. VOCs headspace free:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

<u>Sample Integrity - Documentation</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample labels present on bottles:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. Container labeling complete:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Sample container label / COC agree:	<input checked="" type="checkbox"/>		<input type="checkbox"/>

<u>Sample Integrity - Condition</u>	<u>Y</u>	<u>or</u>	<u>N</u>
1. Sample recvd within HT:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
2. All containers accounted for:	<input checked="" type="checkbox"/>		<input type="checkbox"/>
3. Condition of sample:	Intact		

<u>Sample Integrity - Instructions</u>	<u>Y</u>	<u>or</u>	<u>N</u>	<u>N/A</u>
1. Analysis requested is clear:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
2. Bottles received for unspecified tests	<input type="checkbox"/>		<input checked="" type="checkbox"/>	
3. Sufficient volume recvd for analysis:	<input checked="" type="checkbox"/>		<input type="checkbox"/>	
4. Compositing instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Filtering instructions clear:	<input type="checkbox"/>		<input type="checkbox"/>	<input checked="" type="checkbox"/>

Comments

Accutest Laboratories
V: 732.329.0200

2235 US Highway 130
F: 732.329.3499

Dayton, New Jersey
www.accutest.com

9.1
9

Metals Analysis

QC Data Summaries

(Accutest New Jersey)

Includes the following where applicable:

- Method Blank Summaries
- Matrix Spike and Duplicate Summaries
- Blank Spike and Lab Control Sample Summaries
- Serial Dilution Summaries

BLANK RESULTS SUMMARY
Part 2 - Method Blanks

Login Number: FA18071
Account: ALSE - Accutest Laboratories Southeast, Inc.
Project: TERCFLWP: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP81926
Matrix Type: AQUEOUS

Methods: EPA 1631
Units: ng/l

Prep Date: 09/11/14

Metal	RL	IDL	MDL	MB raw	final
Mercury	0.50	.086	.42	0.073	<0.50

Associated samples MP81926: FA18071-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(anr) Analyte not requested

10.1.1
10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA18071

Account: ALSE - Accutest Laboratories Southeast, Inc.

Project: TERCFLWP: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP81926

Methods: EPA 1631

Matrix Type: AQUEOUS

Units: ng/l

Prep Date:

09/13/14

Metal	FA18071-1 Original MS	SpikeLot HGLL1	% Rec	QC Limits
Mercury	8.2	12.5	5	86.0 71-125

Associated samples MP81926: FA18071-1

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(N) Matrix Spike Rec. outside of QC limits

(anr) Analyte not requested

10.1.2
10

MATRIX SPIKE AND DUPLICATE RESULTS SUMMARY

Login Number: FA18071

Account: ALSE - Accutest Laboratories Southeast, Inc.

Project: TERCFLWP: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP81926
Matrix Type: AQUEOUS

Methods: EPA 1631
Units: ng/l

Prep Date: 09/13/14

Metal	FA18071-1 Original MSD	Spikelot HGLL1	% Rec	MSD RPD	QC Limit
Mercury	8.2	12.6	5	102.0	0.8
					24

Associated samples MP81926: FA18071-1

Results < IDL are shown as zero for calculation purposes
(*) Outside of QC limits
(N) Matrix Spike Rec. outside of QC limits
(anr) Analyte not requested

10.1.2 10

SPIKE BLANK AND LAB CONTROL SAMPLE SUMMARY

Login Number: FA18071

Account: ALSE - Accutest Laboratories Southeast, Inc.

Project: TERCFLWP: Summerport Village WM Replacement; Windermere, FL

QC Batch ID: MP81926

Methods: EPA 1631

Matrix Type: AQUEOUS

Units: ng/l

Prep Date:

09/13/14

09/13/14

Metal	LCS Result	Spikelot HGLL1	% Rec	QC Limits	LCS Result	Spikelot HGLL1	% Rec	QC Limits
Mercury	5.0	5	100.0	77-123	4.4	5	88.0	77-123

Associated samples MP81926: FA18071-1

Results < IDL are shown as zero for calculation purposes

(*) Outside of QC limits

(anr) Analyte not requested

10.1.3
10

**APPENDIX B
EASEMENT SKETCHES**

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SCHEDULE "A"
SKETCH OF DESCRIPTION
PARCEL: 801
ESTATE: PERMANENT EASEMENT
PURPOSE: UTILITY

Description

A 30.00 foot wide strip of land, being a portion of Tract 1, Summerport Village Center Phase 1, according to the plat thereof recorded in Plat Book 52 at Page 5 of the Public Records of Orange County, Florida, being more particularly described as follows:

Commence at the northwest corner of said Tract 1 and thence run South 00° 02' 04" West, along the west line of said Tract 1, a distance of 30.00 feet to the south line of a 30.00 foot wide Utility Easement as described in Official Records Book 6133, Page 2464 of said Public Records and as depicted on said plat and the Point of Beginning; thence run North 89° 44' 04" East, along said south line, a distance of 898.15 feet to a point on the northerly line of a 10.00 wide Utility and Sidewalk Easement as depicted on said plat, said northerly line forming a non-tangent curve concave to the southeast; thence southwesterly along said northerly line having a radius of 605.04 feet, a central angle of 08° 41' 02", a chord bearing of South 70° 37' 11" West, and a chord distance of 91.61 feet an arc distance of 91.70 feet to a point lying 30.00 feet, when measured at right angles, south of said south line; thence run South 89° 44' 04" West, along a line lying 30.00 feet south of and parallel with said south line, a distance of 811.75 feet to said west line, thence run North 00° 02' 04" East, along said west line, a distance of 30.00 feet to the Point of Beginning

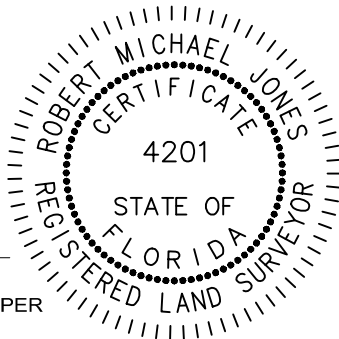
The above described parcel of land contains 25,542 square feet, more or less

Surveyor's Notes:

- 1) This sketch of description is not valid without the signature and the original raised seal of the signing Florida Licensed Surveyor and Mapper.
- 2) The lands described were not abstracted for ownership, easements, right-of-way or other title matters by this firm.
- 3) The parcel location and configuration shown hereon was furnished to the Surveyor by the client.
- 4) This sketch of description does not address the identification or location of jurisdictional wetlands or sovereign lands, if any, that may lie within or adjacent to the lands surveyed.
- 5) Bearings shown hereon are relative to the Florida State Plane Coordinate System, East Zone (0901), North American Datum of 1983/2007 Adjustment, with North line of SUMMERPORT VILLAGE CENTER PHASE 1, according to the plat thereof recorded in Plat Book 52 at page 5 of the Public Records of Orange County, Florida as being N 89°44'04" E.
- 6) Certified to: Orange County Utilities Department



ROBERT M. JONES
 FLORIDA PROFESSIONAL SURVEYOR AND MAPPER
 LICENSE No. LS 4201



THIS IS NOT A SURVEY

PROJECT TITLE: **Summerport Village Center Phase 1**
Permanent Utility Easement
Sketch Of Description

PREPARED BY:

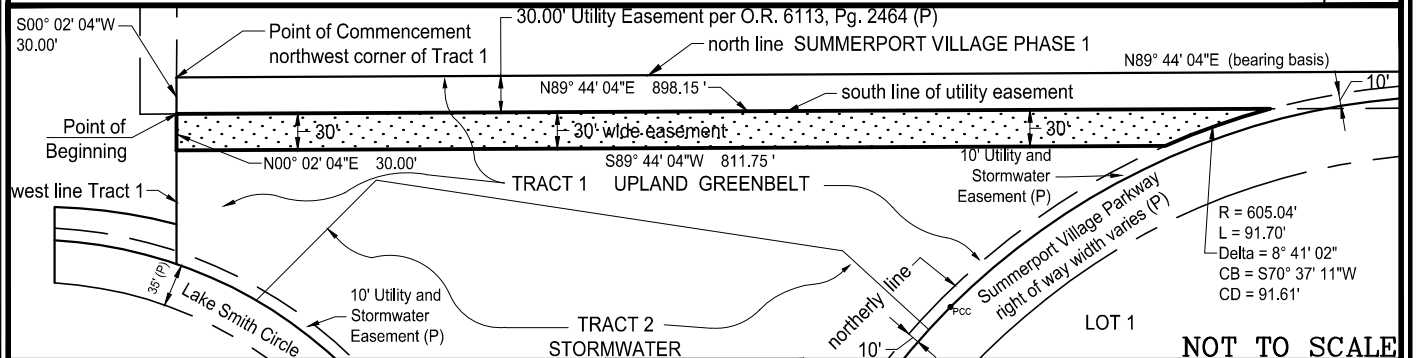
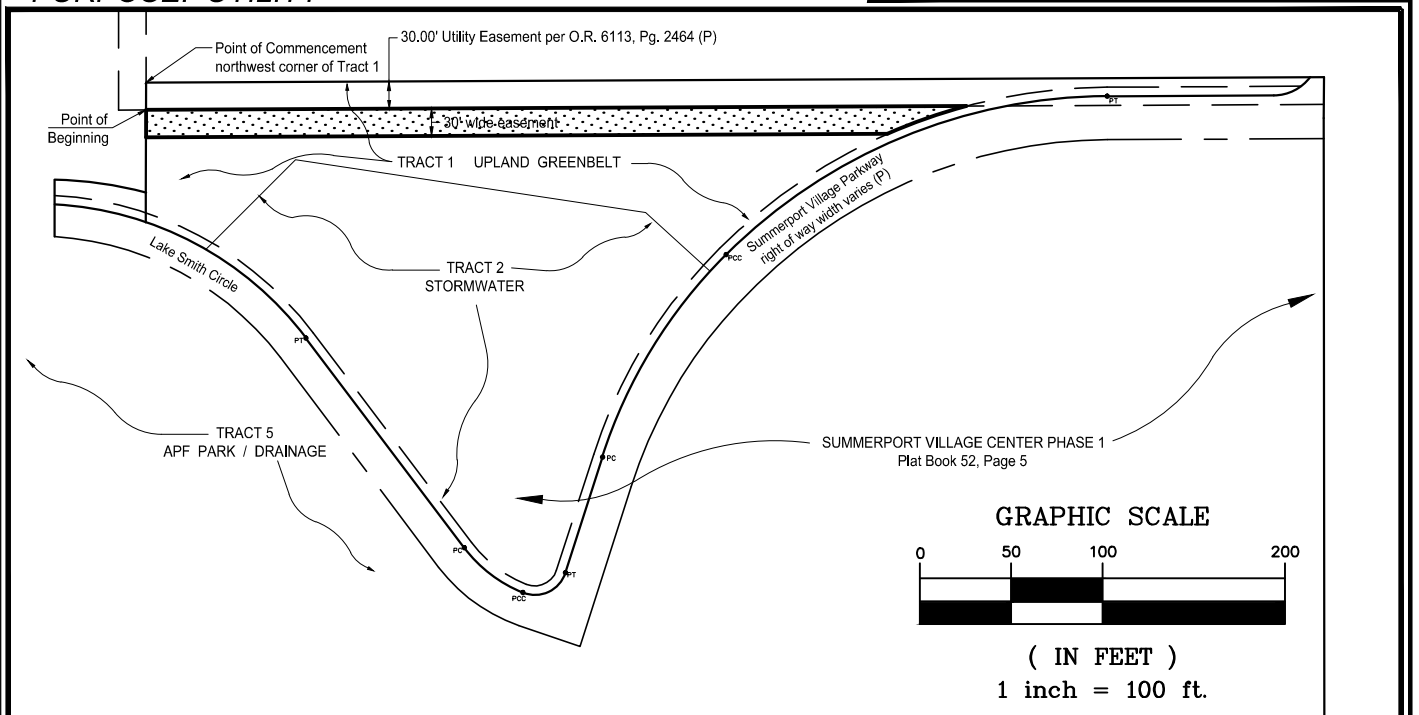


AMEC Environment & Infrastructure, Inc.
 75 East Amelia Street, Suite 200
 Orlando, FL 32801 USA
 Phone: (407) 522-7570
 Fax: (407) 522-7576

Certificate of Authorization Number LB-0007932

DATE	BY	DESCRIPTION
REVISION		
DRAWN BY: <u>P.E.W.</u>	CHKD. BY: <u>R.M.J.</u>	
DATE: <u>Jan/30/2014</u>	DATE: <u>Jan/30/2014</u>	
JOB No. 6374.13.0711	SCALE: N/A	SHT. <u>1</u> OF <u>2</u>
DRAWING NAME: 0711 Summerport PUE.dwg		

SCHEDULE "A"
SKETCH OF DESCRIPTION
PARCEL: 801
ESTATE: PERMANENT EASEMENT
PURPOSE: UTILITY



DETAIL

Legend

- Ⓞ = Centerline
- PC = Point of Curvature
- PCC = Point of Compound Curve
- PT = Point of Tangent
- (M) = Measured
- (C) = Calculated
- (P) = Plat
- O.R. = Official Records Book
- Pg. = Page
- R = Radius
- L = Length of Curve (arc)
- Delta = central angle
- CB = Chord Bearing
- CD = Chord Distance



THIS IS NOT A SURVEY

PROJECT TITLE: **Summerport Village Center Phase 1
 Permanent Utility Easement
 Sketch Of Description**



AMEC Environment & Infrastructure, Inc.
 75 East Amelia Street, Suite 200
 Orlando, FL 32801 USA
 Phone: (407) 522-7570
 Fax: (407) 522-7576

DATE	BY	DESCRIPTION
REVISION		
DRAWN BY: P.E.W.	CHKD. BY: R.M.J.	
DATE: Jan/30/2014	DATE: Jan/30/2014	
JOB No. 6374.13.0711	SCALE: N/A	SHT. 2 OF 2

Certificate of Authorization Number LB-0007932

DRAWING NAME: 0711 Summerport PUE.dwg

SKETCH OF DESCRIPTION

Area being released

Description

A 30.00 foot wide strip of land, being a portion of that certain 30.00' Utility Easement recorded in Official Records Book 6113 at page 2464 of the Public Records of Orange County, Florida and being a portion of Tract 1, Summerport Village Center Phase 1, according to the plat thereof recorded in Plat Book 52 at Page 5 of said Public Records, being more particularly described as follows:

Beginning at the northwest corner of said Tract 1 and thence run North 89° 44' 04" East, along the north line of said Tract 1 and the north line of said Utility Easement, a distance of 739.64 feet; thence run South 00° 15' 56" East, a distance of 30.00 feet to the south line of said Utility Easement; thence run South 89° 44' 04" West, along said south line, a distance of 739.80 feet to the West line of said Tract 1; thence run North 00° 02' 04" East, along said west line, a distance of 30.00 feet to the Point of Beginning

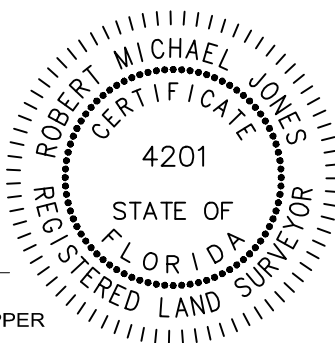
The above described parcel of land contains 22,192 square feet, more or less

Surveyor's Notes:

- 1) This sketch of description is not valid without the signature and the original raised seal of the signing Florida Licensed Surveyor and Mapper.
- 2) The lands described were not abstracted for ownership, easements, right-of-way or other title matters by this firm.
- 3) The parcel location and configuration shown hereon was furnished to the Surveyor by the client.
- 4) This sketch of description does not address the identification or location of jurisdictional wetlands or sovereign lands, if any, that may lie within or adjacent to the lands surveyed.
- 5) Bearings shown hereon are relative to the Florida State Plane Coordinate System, East Zone (0901), North American Datum of 1983/2007 Adjustment, with North line of SUMMERPORT VILLAGE CENTER PHASE 1, according to the plat thereof recorded in Plat Book 52 at page 5 of the Public Records of Orange County, Florida as being N 89°44'04" E.
- 6) Certified to: Orange County Government



ROBERT M. JONES
 FLORIDA PROFESSIONAL SURVEYOR AND MAPPER
 LICENSE No. LS 4201



THIS IS NOT A SURVEY

PROJECT TITLE: **Summerport Village Center Phase 1 Release of a portion of an Existing Utility Easement (ORB 6113, page 2464)**
 Sketch Of Description

PREPARED BY:

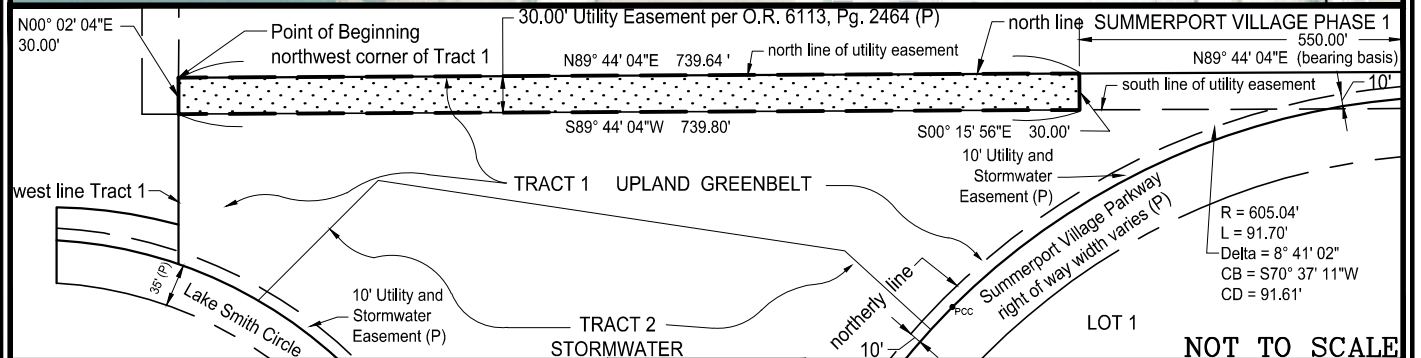
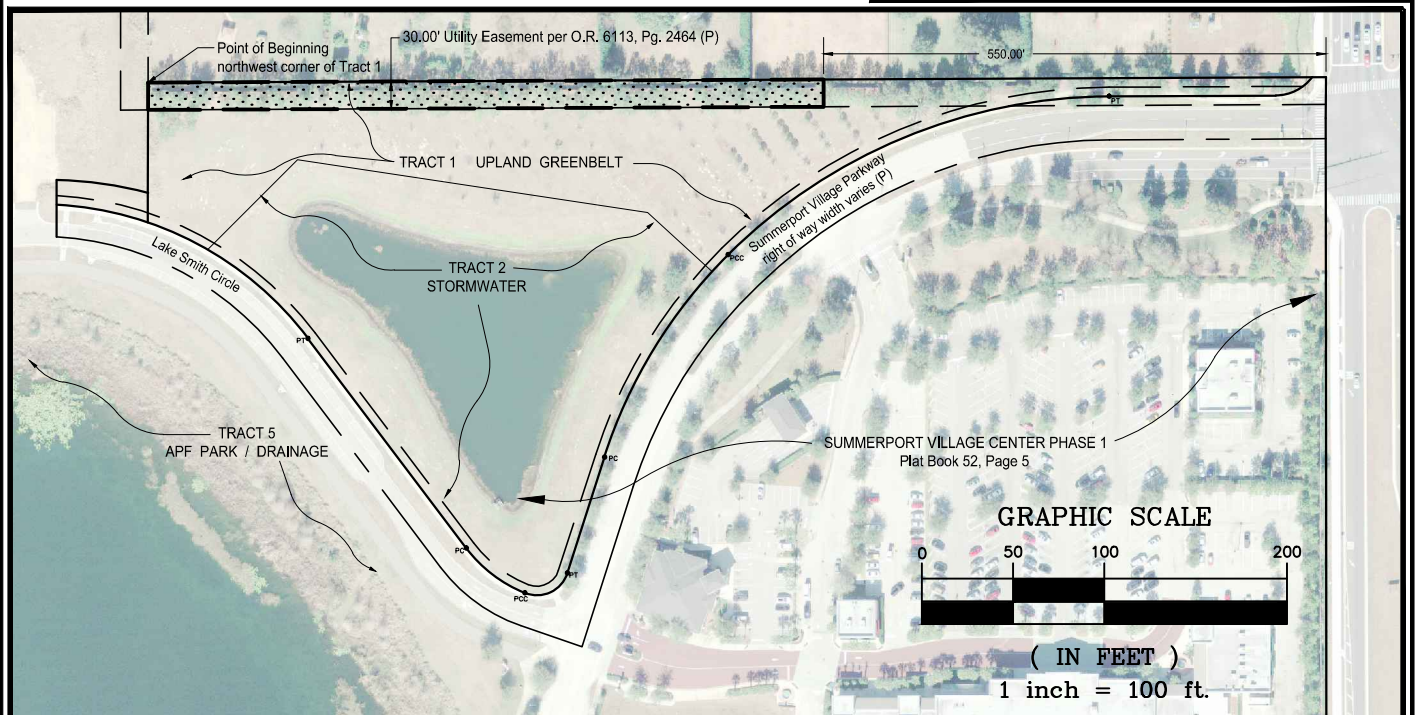


AMEC Environment & Infrastructure, Inc.
 75 East Amelia Street, Suite 200
 Orlando, FL 32801 USA
 Phone: (407) 522-7570
 Fax: (407) 522-7576

Certificate of Authorization Number LB-0007932

DATE	BY	DESCRIPTION
REVISION		
DRAWN BY: <u>P.E.W.</u>	CHKD. BY: <u>R.M.J.</u>	
DATE: <u>Oct/07/2014</u>	DATE: <u>Oct/07/2014</u>	
JOB No. 6374.14.0768	SCALE: N/A	SHT. <u>1</u> OF <u>2</u>
DRAWING NAME: 0768 Summerport Replacement.dwg		

SKETCH OF DESCRIPTION
Area being released



Legend

- Ⓞ = Centerline
- PC = Point of Curvature
- PCC = Point of Compound Curve
- PT = Point of Tangent
- (M) = Measured
- (C) = Calculated
- (P) = Plat
- O.R. = Official Records Book
- Pg. = Page
- R = Radius
- L = Length of Curve (arc)
- Delta = central angle
- CB = Chord Bearing
- CD = Chord Distance



THIS IS NOT A SURVEY

PROJECT TITLE: **Summerport Village Center Phase 1 Release of a portion of an Existing Utility Easement (ORB 6113, page 2464) Sketch Of Description**

PREPARED BY:



AMEC Environment & Infrastructure, Inc.
75 East Amelia Street, Suite 200
Orlando, FL 32801 USA
Phone: (407) 522-7570
Fax: (407) 522-7576

Certificate of Authorization Number LB-0007932

DATE	BY	DESCRIPTION
REVISION		
DRAWN BY:	P.E.W.	CHKD. BY: R.M.J.
DATE:	Oct/07/2014	DATE: Oct/07/2014
JOB No.	SCALE:	SHT. <u>2</u>
6374.14.0768	N/A	OF <u>2</u>
DRAWING NAME: 0768 Summerport Replacement.dwg		

APPENDIX C
PERMITS OBTAINED BY THE COUNTY

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**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION**
CENTRAL DISTRICT
3319 MAGUIRE BOULEVARD, SUITE 232
ORLANDO, FLORIDA 32803-3767

RICK SCOTT
GOVERNOR

CARLOS LOPEZ-CANTERA
LT. GOVERNOR

JONATHAN P. STEVERSON
SECRETARY

Notification of Acceptance of Use of a General Permit

Permittee:

Jose Hernandez, P.E., Chief Engineer
Orange County Utilities Department
9150 Curry Ford Road, 2nd Floor
Orlando, FL 32825
Jose.Hernandez2@ocfl.ent

Permit Number: 0080772-555-DSGP

Issue date: February 23, 2015

Expiration Date: February 22, 2020

County: Orange

Project Name: Summerport Village Water Main
Replacement

Water Supplier: Orange County Western

PWS ID: 3481546

PWS Type: Community

Dear Mr. Hernandez:

On February 19, 2015, the Florida Department of Environmental Protection received a “*Notice of Intent to Use the General Permit for Construction of Water Main Extensions for PWSs*” [DEP Form No. [62-555.900\(7\)](#)], under the provisions of Rule [62-4.530](#) and Chapter [62-555](#), Florida Administrative Code (F.A.C.). The proposed project includes the 24-inch water main replacement to connect to an existing 20-inch water main on the west side of the Lake Cawood Estates development and the existing 24-inch main at Ficquette Road/Summerport Village Parkway. The project also includes removal of approximately 1,000 feet of the existing 24-inch water main that is parallel to Summerport Village Parkway.

The project is located on Summerport Village Parkway, west of the Ficquette Road/Winter Garden Vineland Road intersection, where it will connect to an existing 24-inch water main. The route continues west, parallel to Summerport Village Park approximately 410 linear feet, after which it will continue west parallel to the new easement, approximately 800 linear feet and connect to an existing 20-inch water main within a 30-ft wide county easement.

Based upon the submitted Notice and accompanying documentation, this correspondence is being sent to advise that the Department does not object to the use of such general permit at this time. Please be advised that the permittee is required to abide by Rule [62-555.405, F.A.C.](#), all applicable rules in Chapters [62-4](#), [62-550](#), [62-555](#), F.A.C., and the General Conditions for All General Drinking Water Permits (found in [62-4.540, F.A.C.](#)).

The permittee shall comply with all sampling requirements specific to this project. These requirements are attached for review and implementation.

Pursuant to Rule [62-555.345, F.A.C.](#), the permittee shall submit a certification of construction completion [DEP Form No. [62-555.900\(9\)](#)] to the Department and obtain approval, or clearance,

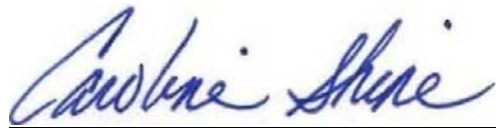
from the Department before placing any water main extension constructed under this general permit into operation for any purpose other than disinfection or testing for leaks.

Within 30 days after the sale or legal transfer of ownership of the permitted project that has not been cleared for service in total by the Department, both the permittee and the proposed permittee shall sign and submit an application for transfer of the permit using Form [62-555.900\(8\), F.A.C.](#), with the appropriate fee. The permitted construction is not authorized past the 30-day period unless the permit has been transferred.

If any existing asbestos cement (AC) pipes are replaced under this project, the permittee shall do so in accordance with the applicable rules of the Federal Asbestos Regulation and Florida DEP requirements. For specific requirements applicable to AC pipes, the permittee should contact Mary Lawrence of the Central District Air and Waste Management at (407).897.4179 prior to commencing any such activities. Please be aware that a notification is required to be submitted to the Department for a regulated project.

This permit will expire five years from the date of issuance. If the project has been started and not completed by that time, a new permit must be obtained before the expiration date in order to continue work on the project, per Rule [62-4.030, F.A.C.](#)

Sincerely,



Caroline Shine, Environmental Administrator
Drinking Water/UIC/Groundwater Permitting
FDEP Central District
(407) 897-2927

cc: Stefano Ceriana, P.E., Reiss Engineering, Inc. [sceriana@Reisseng.com]
Richard Lott, P.G., P.E., FDEP

CLEARANCE REQUIREMENTS

Requirements for clearance upon completion of projects are as follows:

1) Clearance Form

Submission of a fully completed Department of Environmental Protection (DEP) Form [62-555.900\(9\)](#) *Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components into Operation* and a copy of this general permit notification.

2) Record Drawings, if deviations were made

Submission of the portion of record drawings showing deviations from the DEP construction permit, including preliminary design report or drawings and specifications, if there are any deviations from said permit (Note that it is necessary to submit a copy of only the portion of record drawings showing deviations and not a complete set of record drawings.).

3) Bacteriological Results

Copies of satisfactory bacteriological analysis (a.k.a. Main Clearance), taken within sixty (60) days of completion of construction, from locations within the distribution system or water main extension to be cleared, in accordance with Rules [62-555.315\(6\)](#), [62-555.340](#), and [62-555.330](#), F.A.C. and American Water Works Association (AWWA) Standard C 651-92, as follows:

- Point of connection to the existing 20-inch water main;
- Point of connection to the existing 24-inch water main;
- Near Stat. 7+00.

Each location shall be sampled on two consecutive days, with sample points and chlorine residual readings clearly indicated on the report. A sketch or description of all bacteriological sampling locations must also be provided.

The entire clearance document package can be submitted in Portable Document Format (pdf) to DEP_CD@dep.state.fl.us, with a copy to Richard.Lott@dep.state.fl.us for faster processing. Any submitted drawings (must be sized 11" x 17"**) and the engineer of record's signed seal and dates on the required document must be legible for acceptance.**

For further clarification contact:
Richard Lott, P.G., P.E.
3319 Maguire Blvd, Suite 232
Orlando, Florida 32803-3767
(407) 897-4122

APPENDIX D
LIST OF APPROVED MATERIALS

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APPENDIX D

LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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	Blue 36" Tall	AVG2036 Encl	Pantone 36" Tall	AVG2036 Encl	Green 36" Tall
			GP3232 Base		GP3232 Base		GP3232 Base	
			AVG2041 Encl	Blue 41" Tall	AVG2041 Encl	Pantone 41" Tall	AVG2041 Encl	Green 41" Tall
		GP3232 Base		GP3232 Base		GP3232 Base		
	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	

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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			4.0 - 10.0 mils	Hi-Build Epoxoline II	4.0 - 10.0 mils	Hi-Build Epoxoline II	4.0 - 10.0 mils	
Series N69			Series N69		Series N69			
PPG / Ameron	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils		
	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		

APPENDIX D

LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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 Meter	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	
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	

APPENDIX D

LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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
		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		

APPENDIX D

LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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.						
		Certaanteed 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.						
		Certaanteed 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	
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		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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
	Services	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
Services	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		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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
Line Stops	Line Stops							
	JCM							
	Romac							
	Smith Blair							
Tapping Sleeves and Valves	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	

APPENDIX D

LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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	
	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	

APPENDIX D

LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater			
			Model #	Comments	Model #	Comments	Model #	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 minimum 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		
			NA	NA	NA	NA	5600 or 5800 (FLG)	4" & up		
Val-Matic	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 (H2O 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	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	Blue Water Locking Lid	MVB050CR thru MVB130CR with Extension Stem	Purple Square Locking Reclaim Lid	MVB050C thru MVB130C with Extension Stem	Green Sewer locking Lid
			MVB875 Guide Plate		MVB875 Guide Plate		MVB875 Guide Plate			

APPENDIX D

LIST OF APPROVED PRODUCTS - GRAVITY SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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-Graffiti (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		

APPENDIX D

LIST OF APPROVED PRODUCTS - GRAVITY SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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	

APPENDIX D

LIST OF APPROVED PRODUCTS - GRAVITY SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	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		
	Joining Material	Joining 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		

APPENDIX D

LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	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 shall have Diaphragm Seals. Oil filled.						
Ashcroft		NA	NA	NA	NA	10 1008SL 02L 60#	Gauge Diaphragm Seal	
		25 200SS 02T XYTSE						
Terice		NA	NA	NA	NA	D83LFSS4002LA100 - Gauge		
					M51001SSSS - Diaphragm Seal			
Winter Gauges					D99100 Fill and Mount Charge			
					PFQ770 0-60 PSI			
					D70950 top			
Pumps	Submersible Pumps							
	ABS	NA	NA	NA	NA			
	Flygt	NA	NA	NA	NA			

APPENDIX D

LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Pumps	Floats	Float Regulator (FR) - Duplex and Triplex Pump Stations						
		Atlantic Scientific	NA	NA	NA	NA	Roto-Float	
Pumps	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 Disconnect	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 IEEE C62, 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	
		Joslyn 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	

APPENDIX D

LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Pump Station Control Panel		Alarm Light / With Base and Globe (AL)						
	AL	American Electric	NA	NA	NA	NA	F32552	
		Red Dot Globe	NA	NA	NA	NA	VGLR-01	
		Red Dot Base					VA-01	
		Alarm Horn (AH)						
	AH	Wheelock	NA	NA	NA	NA	3IT-115-R	
		Fuses (F)						
	Fuse	Bussmann	NA	NA	NA	NA	FNQ-R or KTK-R	
		Hand-Auto-Off Selector (HOA)						
	HOA	Square D	NA	NA	NA	NA	9001-SKS43B	
		Horn Silence Button (HSS)						
	HSS	Square D	NA	NA	NA	NA	9001-SKR1RH5	
		Mechanical Interlock						
	Inter-lock	Square D	NA	NA	NA	NA	S29354	
		Control Panel Main Circuit Breaker (MCB) With S29450 Circuit Breaker Auxiliary Switch						
	Breakers	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		
	Motor Starter (MS)							
MS	Square D	NA	NA	NA	NA	Type S Class 8536		
	Overload Heater(OL)							
OL	Square D	NA	NA	NA	NA	Part number will vary with size needed		
	Overload Reset							
OR	Square D	NA	NA	NA	NA	9066-RA1		
	Control Circuit Transformer (XMFR)							
Transformer	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	
	Supplemental Protector Breaker - 3 pole, 1-amp for Phase Monitor							
SPB	Square D	NA	NA	NA	NA	MG24532		

APPENDIX D

LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS

FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater		
			Model #	Comments	Model #	Comments	Model #	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			

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FEBRUARY 11, 2011

Cat.	Desc	Manufacturer	Water		Reclaimed Water		Wastewater	
			Model #	Comments	Model #	Comments	Model #	Comments
Pump Station Control Pane	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 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	Variable Frequency Drives							
	Square D	NA	NA	NA	NA			