
INVITATION FOR BIDS
FOR
SSA-ESA WATER MAIN
(MEADOW WOODS WSF ALONG RHODE ISLAND WOODS CIRCLE)

PART H
TECHNICAL SPECIFICATIONS

BID DOCUMENTS

PART H

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TO
PROJECT MANUAL
ORANGE COUNTY
SSA-ESA WATER MAIN
(MEADOW WOODS WSF ALONG RHODE ISLAND WOOD CIRCLE)

OCU Project Sequence No. _____

CPH Project No. O28416

September 2014

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CONDITIONS OF THE CONTRACT**

TO BE PROVIDED BY ORANGE COUNTY PURCHASING

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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 specifications and 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 incidental to the construction operation, the Contractor shall, after completion of the
11 work, 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 1.07 MAINTENANCE OF SERVICE

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

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

16 1.08 TRANSFER OF SERVICE

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

20 1.09 LABOR

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

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

33 C. Apprenticeship: The Contractor shall comply with all of the requirements of Section
34 446, Florida Statutes, for all contracts in excess of \$25,000 excluding roadway,
35 highway or bridge contracts and the Contractor agrees to insert in any subcontract
36 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 new (most current production at time of bid)
18 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. The material or
11 equipment not accepted by the County shall be replaced with acceptable material,
12 without cost to the County.
- 13 2. Tests of electrical and mechanical equipment and appliances shall be conducted in
14 accordance with recognized test codes of the ANSI, ASME, or the IEE, except as
15 may otherwise be stated herein.
- 16 3. The Contractor shall give notice in writing to the County sufficiently in advance of
17 his intention to commence the manufacture or preparation of materials especially
18 manufactured or prepared for use in or as part of the permanent construction. Such
19 notice shall contain a request for inspection, the date of commencement and the
20 expected date of completion of the manufacture or preparation of materials. Upon
21 receipt of such notice, the County shall arrange to have a representative present at
22 such times during the manufacture as may be necessary to inspect the materials; or
23 the County will notify the Contractor that the inspection will be made at a point other
24 than the point of manufacture; or the County will notify the Contractor that inspection
25 will be waived.
- 26 4. When inspection is waived or when the County/Professional so requires, the
27 Contractor shall furnish to the County authoritative evidence in the form of
28 Certificates of Manufacture that the materials to be used in the Work have been
29 manufactured and tested in conformity with the Contract Documents. These
30 certificates shall be notarized and shall include five (5) copies of the results of
31 physical tests and chemical analysis, where necessary, that have been made directly
32 on the product or on similar products of the manufacturer.
- 33 5. The Contractor must comply with these provisions before shipping any material.
34 Such inspections by the County shall not release the Contractor from the
35 responsibility for furnishing materials meeting the requirements of the Contract
36 Documents.

37 B. Cost

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

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

7 C. Shop Testing

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

21 D. Field Testing:

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

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

39 F. Final Inspection: Prior to preparation of the final payment application, a final inspection
40 will be performed by the County to determine if the Work is properly and satisfactorily
41 constructed in accordance with the requirements of the Contract Documents. See also
42 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, manholes or other piping and buildings within the work area.
- 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/business service connections, vaults, manholes
5 and all other appurtenances and facilities pertaining thereto, whether owned or
6 controlled by governmental bodies or privately owned by individuals, firms or
7 corporations, used to serve the public with transportation, traffic control, gas,
8 electricity, telephone, sewerage, drainage or water. Other public or private property,
9 which may be affected 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 open cuts shall be backfilled, compacted, and
28 limerock base spread and compacted immediately after installation. Contractor
29 shall coordinate with the County and/or individual property owners prior to
30 removing driveway section. Any utility crossing an existing roadway, parking lot
31 or other paved area shall be patched by the end of the working day.
- 32 b. All pipe and fittings and appurtenances shall be neatly stored in a location, which
33 will cause the least disturbance to the public. All debris shall be removed and
34 properly disposed of by the end of each working day.
- 35 c. Final Restoration Overlay: After completing all installations, and after testing of
36 the Work (but no sooner than 30-days after applying the S-I asphaltic surface),
37 final restoration shall be performed. In no event shall final restoration begin after
38 substantial completion. Final restoration shall provide an S-3 asphaltic overlay as
39 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 (IF REQUIRED)

- 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. Maintain public highway traffic within the limits of the Project for the duration of the
28 construction period, including any temporary suspensions of work. Work shall also
29 include construction and maintenance of any necessary detour facilities; furnishing,
30 installing and maintaining of traffic control and safety devices, control of dust, or any
31 other special requirements for safe and expeditious movement of vehicular and
32 pedestrian traffic.
- 33 2. Traffic Control shall be provided at the Contractor's expense by the Contractor's
34 personnel or off-duty uniformed police officer, depending on and as required by the
35 applicable traffic control requirements jurisdictional to the construction or road.
- 36 3. The Contractor shall prepare and submit a Maintenance of Traffic plan (MOT) to the
37 County/Professional and to the agency with jurisdiction for MOT (Orange County
38 Public Works, FDOT, local municipalities, etc.) for review and acceptance prior to
39 commencing any work. The Traffic Control Plan shall detail procedures and
40 protective measures proposed by the Contractor to provide for protection and control
41 of traffic affected by the Work consistent with the following applicable standards:
- 42 a. Standard Specifications for Road and Bridge Construction, Latest Edition
43 including all subsequent supplements issued by the Florida Department of
44 Transportation.

- 1 b. Manual of Traffic Control and Safe Practices for Street and Highway
- 2 Construction, Maintenance and Utility Operations, FDOT.
- 3 c. Right-of-Way Utilization Regulations, Orange County, Florida, latest edition. All
- 4 references to the respective agency in the above referenced standards shall be
- 5 construed to also include the County for this Work.
- 6 4. The cost of any required road permits shall be borne by the Contractor.
- 7 5. The Contractor will notify the public one (1) week in advance of any scheduled work
- 8 via the use of portable message boards. The message boards shall be located at each
- 9 approach to the construction area.
- 10 6. Before closing any thoroughfare, the Contractor shall give written notice to, and if
- 11 necessary, obtain a permit or permits from the duly constituted public authority
- 12 having jurisdiction over the thoroughfare. Notice shall be given no less than 72-hours
- 13 in advance of the time when it may be necessary in the process of construction to
- 14 close such thoroughfare, or as may be otherwise provided in the acceptable
- 15 Maintenance of Traffic plan.
- 16 7. The Contractor shall sequence and plan construction operations and shall generally
- 17 conduct his work in such a manner as not to unduly or unnecessarily restrict or
- 18 impede existing normal traffic through the streets of the local community.
- 19 8. If required by duly constituted public authority, the Contractor shall, at his own
- 20 expense, construct bridges or other temporary crossing structures over trenches so as
- 21 not to unduly restrict traffic. Such structures shall be of adequate strength and proper
- 22 construction and shall be maintained by the Contractor in such a manner as not to
- 23 constitute an undue traffic hazard.
- 24 9. The Contractor shall make provisions at all "open cut" street crossings to allow a
- 25 minimum of one lane to be open for vehicular traffic at all times. Lane closing shall
- 26 be as permitted by the local governing authority and shall be repaired to a smooth,
- 27 safe driving surface immediately following the installation of pipe or conduit.
- 28 10. The Contractor shall make provisions at cross streets for the free passage of vehicles
- 29 and pedestrians, either by bridging or otherwise, and shall not obstruct the sidewalks,
- 30 gutters, or streets, nor prevent in any manner the flow of water in the latter, but shall
- 31 use all proper and necessary means to permit the free passage of surface water along
- 32 the gutters.
- 33 11. The Contractor shall immediately cart away all offensive matter; exercising such
- 34 precaution as may be directed by the County. All material excavated shall be so
- 35 disposed of as to inconvenience the public and adjacent tenants as little as possible
- 36 and to prevent injury to trees, sidewalks, fences and adjacent property of all kinds.

37 C. BARRIER AND LIGHTS

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

1 D. DEWATERING AND FLOTATION

- 2 1. The Contractor, with his own equipment, shall do all pumping necessary to dewater
3 any part of the work area during construction operations to insure dry working
4 conditions. The Contractor shall take the necessary steps to protect on-site and off-
5 site structures. Damage to any structures due to dewatering shall be repaired or the
6 structures replaced at the Contractor's expense.
- 7 2. The Contractor shall be completely responsible for any tanks, wetwells or similar
8 structures that may become buoyant during the construction and modification
9 operations due to the ground water or floods and before the structure is put into
10 operation. The proposed final structures have been designed to account for
11 buoyancy; however the Contractor may employ methods, means and techniques
12 during construction which may affect the buoyancy of structures. The Contractor
13 shall take the necessary steps to protect structures. Damage to any structures due to
14 floating or flooding shall be repaired or the structures replaced at the Contractor's
15 expense.
- 16 3. Contractor shall be responsible for any required permits for the discharge of ground
17 water.

18 E. DUST AND EROSION CONTROL

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

36 F. LINES AND GRADES

- 37 1. All Work under this Contract shall be constructed in accordance with the lines and
38 grades shown on the Drawings, or as given by the County/Professional.
- 39 2. When the location of the Work is dimensioned on the Drawings, it shall be installed in
40 that location; when the location of the Work is shown on a scaled drawing, without
41 dimensions, the Work shall be installed in the scaled location unless the County approves
42 an alternate location for the piping. Where fittings are noted on the Drawings, such
43 notation is for the Contractor's convenience and does not relieve the Contractor from
44 laying and jointing different or additional items where required. The County/Professional
45 may require detailed pipe laying drawings and schedules for project control.

- 1 3. The Contractor shall, at his own expense, establish all working or construction lines
- 2 and grades as required from the project control points set by the County, and shall be
- 3 solely responsible for the accuracy thereof.
- 4 4. Water main shall be installed to provide long uniform gradient or slope to pipe to
- 5 minimize air pockets and air release valves.
- 6 5. To insure a uniform gradient for gravity pipe and pressure pipe, all lines shall be
- 7 installed using the following control techniques as a minimum:
- 8 a. Gravity lines; continuous control, using laser beam technology.
- 9 b. Pressure lines; control stakes set at 50-foot intervals using surveyors' level
- 10 instrument.

11 G. TEMPORARY CONSTRUCTION

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

19 H. DAILY REPORTS

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

42 I. CLEANING

- 43 1. During Construction

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

33 1.16 CONSTRUCTION NOT PERMITTED

34 A. USE OF EXPLOSIVES

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

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

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

1

2

END OF SECTION

1

2 1.02 WORKING HOURS

3 A. Working hours for the County Inspector are an 8-hour period between the hours of 7:00
4 a.m. and 4:00 p.m., Monday through Friday. Any work beyond the 8-hour period is to be
5 requested in writing 48 hours prior and paid for by the Contractor. Any work required on
6 Saturday, Sunday or Holidays shall be requested in writing 48 hours in advance. All
7 requests must be submitted to the County and approved by the County in advance. Under
8 emergency situations, a verbal request may be made with a follow-up written request.

9 B. The Contractor shall pay the County for County Inspector time outside of normal
10 Working Hours at a rate of \$51.00/hour. The Contractor agrees that the County shall
11 deduct such charges from the Contract Amount by a deductive Change Order.

12 1.03 CONTRACTOR'S USE OF PREMISES

13 A. The Contractor shall assume full responsibility for the protection and safekeeping of
14 products and materials at the job site. If additional storage or work areas are required,
15 they shall be obtained by the Contractor at no additional cost to the Owner.

16 1.04 SEQUENCE OF WORK

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

19 B. The sequence of demolition and renovation of existing facilities will be in accordance
20 with the approved demolition and removal plan. Below is a basic outline of project
21 sequence to be used as the basis for Contractor's detailed sequence of construction:

- 22 1. Starting from the east end of the project, isolate each portion of water main to be
23 removed and replaced while keeping the balance of the existing water main in
24 service.
- 25 2. Install the new water main, existing service laterals including all fittings, valves,
26 restraints and appurtenances.
- 27 3. Remove the existing water main including all fittings and appurtenances as new
28 sections are completed, tested and cleared for use.
- 29 4. Backfill and compact over and around new installation.
- 30 5. Provide required testing and as-builts for clearance through the County and FDEP.
- 31 6. Restoration of disturbed pavement, curbing, sidewalk, street lighting and right-of-way
32 areas to equal or better condition.

33
34 1.05 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES

35 A. The Contractor shall give written notice to all governmental utility departments and other
36 owners of public utilities of the location of the proposed construction operations, at least
37 seventy-two hours in advance of breaking ground in any area or on any unit of the Work.

- 1 B. Some of the utility contacts are listed on the plans for the Contractor's convenience.
- 2 C. The maintenance, repair, removal, relocation or rebuilding of the public utility
- 3 installation and structures, when accomplished by the Contractor as herein provided, shall
- 4 be done by methods approved by the utility involved.

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

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

7

8 END OF SECTION

1

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1 **SECTION 01025**

2 **MEASUREMENT AND PAYMENT**

3 **PART 1 - GENERAL**

4 1.01 REQUIREMENTS INCLUDED

- 5 A. This Section specifies administrative and procedural requirements to define pay items
6 and determine payable amounts, and includes but is not limited to:
7 1. General Provisions
8 2. Cash Allowances
9 3. Work Not Paid for Separately
10 4. Measurement for Payment
11 5. Partial Payment for Stored Materials and Equipment

12 1.02 GENERAL PROVISIONS

- 13 A. This specification includes standard descriptions for all bid items. This Contract's
14 specific bid items are listed in the Bid Schedule.
- 15 B. The total Contract Amount shall cover the Work required by the Contract Documents.
16 All costs in connection with the successful completion of the Work, including
17 furnishing all materials, equipment, supplies, and appurtenances; providing all
18 construction, equipment, and tools; and performing all necessary labor and supervision
19 to fully complete the Work, shall be included in the unit and lump sum prices bid. All
20 Work not specifically set forth as a pay item in the Bid Form shall be considered a
21 subsidiary obligation of the Contractor and all costs in connection therewith shall be
22 included in the prices bid.
- 23 C. If used, all estimated quantities stipulated in the Bid Schedule or other Contract
24 Documents are approximate and are to be used only (a) for the purpose of comparing
25 the bids submitted for the Work, and (b) as a basis for determining an initial Contract
26 Amount. The actual amounts of Work completed and materials furnished under unit
27 price items may differ from the estimated quantities. The County does not expressly or
28 by implication represent that the actual quantities involved will correspond exactly to
29 the quantities stated in the Bid Schedule; nor shall the Contractor plead
30 misunderstanding or deception because of such estimate or quantities or of the
31 character, location or other conditions pertaining to the Work. Payment to the
32 Contractor will be made only for the actual quantities of work performed or material
33 furnished in accordance with the Drawings and other Contract Documents, and it is
34 understood that the quantities may be increased or decreased as provided in the General
35 Conditions.

- 1 D. If used, the unit prices listed in the Bid Schedule shall include all services, obligations,
2 responsibilities, labor, materials, devices, equipment, royalties and license fees,
3 supervision, temporary facilities, construction equipment, bonds, insurance, taxes, clean
4 up, traffic control, control surveys, field offices, close out, overhead and profit and all
5 connections, appurtenances and any other incidental items of any kind or nature, as are
6 necessary to complete the Work in accordance with the Contract Documents.
- 7 E. Except for mobilization/demobilization and project record documents, payment for
8 Work will be based on the percent of completed work of each item in the Schedule of
9 Values, including stored materials, as determined by the County. Progress of work in
10 each item of the Schedule of Values will be determined separately by the County.
11 However, the County will issue a single payment certificate for progress on the
12 Contract.
- 13 F. The Contractor agrees that it will make no claim for damages, anticipated profits, or
14 otherwise because of any difference between the amounts of work actually performed
15 and materials actually furnished and the estimated amounts therefore.
- 16 G. Where payment by scale weight is specified under certain items, the Contractor shall
17 provide suitable weighing equipment which shall be kept in accurate adjustment at all
18 times and certified. The weighing of all material shall be performed by the Contractor
19 in the presence and under the supervision of the County.
- 20 H. All schedules included in the Contract Documents are given for convenience and are
21 not guaranteed to be complete. The Contractor shall assume all responsibility for the
22 making of estimates of the size, kind, and quantity of materials and equipment included
23 in work to be done under this Contract.
- 24 I. Where pipe fittings are noted on the Drawings, such notation is for the Contractor's
25 convenience and does not relieve the Contractor from laying and jointing different or
26 additional items where required.

27 1.03 CASH ALLOWANCES

- 28 A. The Contractor shall include in the Total Bid Amount, all cash allowances stated in the
29 Contract Documents. Items covered by these allowances shall be supplied for such
30 amounts and by such persons as the County may direct.
- 31 B. The Contractor will obtain the County's written acceptance before providing
32 equipment, materials or other Work under a cash allowance. Payments under a cash
33 allowance will be made based on actual costs, excluding costs of general conditions,
34 handling, unloading, storage, installation, testing, etc., which will be considered to be
35 included within the Contract Price. Payments within the limits of any Allowance will
36 exclude overhead and profit and bond and insurance premiums, since those costs will
37 be considered to be included within the Contract Amount. The Contractor shall submit
38 appropriate documentation to validate the actual cost of the item.

1 C. The amount of the allowance shall be adjusted accordingly by Change Order to
2 recognize the allowable cost incurred by the Contractor.

3 1.04 WORK NOT PAID FOR SEPARATELY

4 A. Delivery: Payment for equipment delivery, storage or freight shall be included in the
5 pay items including their installation and no other separate payment will be made
6 therefore.

7 B. Bonds: Payment for bonds required by the Contract shall be included in the pay items
8 for the Work covered by the required bonds and no separate payment will be made.

9 C. Preparation of Site: Payment for preparation of site shall be included in pay items
10 proposed for the various items of Work and no separate payment will be made
11 therefore. Preparation of site includes setting up construction plant, offices, shops,
12 storage areas, sanitary and other facilities required by the specifications or state law or
13 regulations; providing access to the site; obtaining necessary permits and licenses;
14 payments of fees; general protection, temporary heat and utilities including electrical
15 power; providing shop and working drawings, certificates and schedules; providing
16 required insurance; cleaning up; and all other work regardless of its nature which may
17 not be specifically referred to in a Bid Item but is necessary for the complete
18 construction of the project set forth by the Contract.

19 D. Permitting & Permit Fees.

20 E. The County reserves the right to delete any item included in the Schedule of Values and
21 decrease the Contract Price by the scheduled amount for the item deleted.

22 1.05 MEASUREMENT FOR PAYMENT

23 A. Methods of Measurement - Generally:

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

- 25 a. Linear Feet (LF)
- 26 b. Square Feet (SF)
- 27 c. Square Yards (SY)
- 28 d. Cubic Yards (CY)
- 29 e. Each (EA)
- 30 f. Sacks (SK)
- 31 g. Lump Sum (LS)

32 2. Unit Price Contracts/Items:

33 a. Linear Feet (LF) shall be measured along the horizontal length of the centerline
34 of the installed material, unless otherwise specified. Pipe shall be measured
35 along the length of the completed pipeline, regardless of the type of joint
36 required, without deduction for the length of valves or fittings. Pipe included
37 within the limits of lump sum items will not be measured.

1 b. Square Feet (SF), Square Yards (SY), Cubic Yards (CY), Each (EA) and Sacks
2 (SK) shall be measured as the amount of the unit of measure installed and
3 compacted within the limits specified and shown in the Specifications and
4 Drawings. Slope angles and elevations shall be measured using land-surveying
5 equipment. Contractor shall provide supporting documentation (i.e. drawings,
6 delivery tickets, invoices, survey calculations, etc.) to verify actual installed
7 quantities.

8 B. Lump Sum Contracts/Items - Generally:

- 9 1. Quantities provided in the Schedule of Values are for the purpose of estimating the
10 completion status for progress payments. Payment will be made for each individual
11 item on a percentage of completion basis as estimated by the Contractor and
12 approved by the County.
- 13 2. Adjustments to costs provided in the accepted Schedule of Values may be made only
14 by Change Order.
- 15 3. The County reserves the right to delete any item included in the Schedule of Values
16 and decrease the Contract Price by the scheduled amount for the item deleted.

17 1.06 MEASUREMENT AND PAYMENT ITEMS

18 A. ***Only those bid items included in the Bid Schedule are applicable for this Contract.***

19 The County has standardized the measurement and payment items. Currently, there are
20 approximately 100 measurement and payment items describing approximately 300 bid
21 items. The bid item numbering system comprises five sections that are divided into 23
22 subsections. The sections and subsections are listed below.

- 23
- 24 10. General Requirements
- 25 10.1 General
- 26 11. Site Work
- 27 11.1 Miscellaneous
- 28 11.2 Road Work
- 29 11.3 Install/Replace Street Lighting
- 30 11.4 Bypass Pumping
- 31 11.5 Abandon or Remove Pipe/Structure
- 32 12. Pressure Pipes
- 33 12.1 Pressure Pipe and Fittings and Restrained Joints
- 34 12.2 Valves
- 35 12.3 Tapping Sleeve and Valve Assembly
- 36 12.4 Connections to Existing Water Main
- 37 12.5 Piping Appurtenances
- 38 12.6 Directional Drill
- 39 12.7 Pipe Bursting

- 1 13. Wastewater Collection System (Not Used)
- 2 13.1 Cleaning Sanitary Sewers
- 3 13.2 CCTV Sanitary Sewers
- 4 13.3 Install/Replace Sanitary Sewer
- 5 13.4 Install/Replace Sanitary Manholes
- 6 13.5 Sanitary Manhole Rehabilitation
- 7 13.6 Sanitary Service Laterals and Cleanouts
- 8 13.7 Cured-in-Place Pipe (CIPP) Liner
- 9 13.8 Sanitary Sewer Pipe Bursting
- 10 14. Pump Stations (Not Used)
- 11 14.1 Wastewater Duplex Pump Station
- 12 14.2 Wastewater Triplex Pump Station

13 All of the subsections have bid item measurement and payment descriptions. Several
14 bid items in the Project Bid Schedule may be described with the same bid item
15 measurement and payment description in Table A, "Measurement and Payment Items".
16 The bid items in the Project Bid Schedule are related to the Section 01025
17 Measurement and Payment items as follows:

- 18 1. All of the bid items in the Project Bid Schedule have 8 numerical digits.
- 19 2. Table A, "Measurement and Payment Items" for each of the bid items there are five
20 numerical digits followed by ".xxx".
- 21 3. The first 5 numerical digits of the bid item in the Project Bid Schedule designate the
22 measurement and payment item found in Table A, "Measurement and Payment
23 Items."
24

Table A

BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS Pg 1
	10 GENERAL REQUIREMENTS
	10.1 - General
1	Reference ID 10.110.xxx Mobilization, Demobilization, Bonds, and Permits (not to exceed 5% of the total of all bid items except bid items under section 10.1 General)
	<p>a. Measurement: Measurement of various items for Mobilization and Demobilization shall not be made for payment and all items shall be included in the lump sum price. <u>This lump sum price shall not exceed 5% of the total of all bid items except bid items under section 10.1 General.</u></p> <p>b. Payment: Payment of 75 percent of the applicable lump sum price for the item shall be full compensation for the Work consisting of the preparatory Work and operations in mobilizing for beginning Work on the Contract, including, but not limited to, movement of those personnel, equipment, supplies and incidentals to the project site, preparation of submittals, and for the establishment of temporary offices and buildings, safety equipment and first aid supplies, project signs, field surveys, sanitary and other facilities required by these specifications, and State and local laws and regulations. The costs of General Requirements (Section 01001), bonds, permits, and any required insurance, project signs, and any other preconstruction expense necessary for the start of the work, excluding the cost of construction materials, shall also be included. This Work also consist of the general project management of the Work including, but not limited to, field supervision and office management, as well as other incidental cost for management of the Work during the duration of the Contract. This Work also includes maintenance of the field offices for the duration of the Contract.</p> <p>Payment of the remaining 25 percent of the applicable lump sum price for this item also consists of demobilization or the operations normally involved in ending Work on the project including, but not limited to, termination and removal of temporary utility service and field offices; demolition and removal of temporary structures and facilities; restoration of Contractor storage areas; disposal of trash and rubbish, and any other post-construction work necessary for the proper conclusion of the Work.</p>
2	Reference ID 10.120.xxx Preconstruction Audio-Video Documentation
	<p>a. Measurement: Measurement shall be based on the satisfactory submittal of a comprehensive pre-construction video in accordance with the County requirements and specifications (Section 01101).</p> <p>b. Payment: Payment of the applicable Contract lump sum price as stated in the proposal will be full compensation for furnishing all labor, materials, and equipment necessary to create a comprehensive pre-construction video in accordance with the County requirements and specification.</p>

BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS <small>Pg 2</small>
3	<p>Reference ID 10.130.xxx Indemnification</p> <p>a. Payment: In consideration of the Contractor's Indemnity Agreement as set out in the Contract Documents, the County specifically agrees to give the Contractor a maximum of \$100.00 and other good and valuable consideration, receipt of which is acknowledged upon signing of the Agreement.</p> <p>b. Payment: In consideration of the Contractor's Indemnity Agreement as set out in the Contract Documents, the County specifically agrees to give the Contractor a maximum of \$100.00 and other good and valuable consideration, receipt of which is acknowledged upon signing of the Agreement.</p>
4	<p>Reference ID 10.140.xxx Project Record Documents (a minimum of 1% of the total of all bid items except bid items under section 10.1 General)</p> <p>a. Measurement: Measurement for this item shall be based on satisfactory progress of the Contractor to provide Project Record Documents in accordance with the County requirements and specifications (Section 01720). Various items for Project Record Documents shall not be made for individual payment and all items shall be included in the lump sum price. <u>This lump sum price shall be a minimum of 1% of the total of all bid items except bid items under section 10.1 General).</u></p> <p>b. Payment: Payment of the applicable Contract lump sum price as stated in the proposal will be full compensation for furnishing all labor, materials, and equipment necessary to create the Project Record Drawings, including the certified as-built survey, in accordance with the County requirements and specifications. Payment will be made at the lump sum price divided into equal monthly payments based on the Contract Time and acceptance by County of the progressive as-builts drawings and tables.</p>
5	<p>Reference ID 10.150.xxx Maintenance of Traffic</p> <p>a. Measurement: Measurement shall be based on satisfactory Maintenance of Traffic (MOT) in accordance with County requirements and Florida Department of Transportation (FDOT) standards.</p> <p>b. Payment: Payment of the applicable Contract lump sum price as stated in the proposal will be full compensation for furnishing all labor, materials, and equipment necessary to maintain public roadway and pedestrian traffic including flag men, uniformed police officers, barricades, warning lights/flashers, and safety ropes. Also included is furnishing, installing and maintaining a Traffic Control Plan, control and safety devices, control of dust, temporary crossing structures over trenches, any necessary detour facilities, and other special requirements for the safe and expeditious movements of traffic.</p>

BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS <small>Pg 3</small>
	11 SITE WORK
	11.1 – Miscellaneous
6	Reference ID 11.120.xxx Unsuitable Materials
	<p>a. Measurement: Unsuitable Material shall be measured in actual cubic yards removed and disposed of in accordance with the County requirements and specifications. Extra volume beyond the limits of construction will not be measured for payment. The Contractor shall provide survey calculations to verify actual removed quantities.</p> <p>b. Payment: Payment will be made at the contract unit price bid per cubic yard as stated in the proposal and shall include all labor, materials and equipment to remove and dispose of unsuitable material including the removal of overburden.</p>
	11.2 - Road Work
7	Reference ID 11.230.xxx Milling and Resurfacing
	<p>a. Measurement: Milling and Resurfacing shall be measured in actual square yards over which the milling and subsequent resurfacing is completed and accepted at the thickness as indicated in the Drawings.</p> <p>b. Payment: Payment will be made at the contract unit price bid per square yard as stated in the proposal for Milling and Resurfacing and shall include all labor, materials, and equipment to mill surface; dispose of milled materials; and apply Type S-3 asphalt surface overlay; and striping and signage in accordance with County requirements and specifications. The unit price bid shall also include traffic signalization repair, and permanent striping and markings.</p>
8	Reference ID 11.240.xxx Road Crossing Pavement Restoration
	<p>a. Measurement: Road Crossing Pavement Restoration shall be measured in actual square yards of existing asphalt paving and subgrade removal and replacement, furnished and installed, in accordance with the County requirements and specifications. The width measured for payment of asphalt surface repair, as measured perpendicular to the centerline of the pipe, shall be limited to the width shown on the Drawings (maximum pay width of 10-feet). The length shall be as measured along the centerline of the pipe.</p> <p>b. Payment: Payment will be made at the contract unit price bid per square yard as stated in the proposal for Road Crossing Pavement Restoration and shall include all labor, materials, and equipment necessary to provide a safe, smooth driving surface. The Work shall include saw cutting, pavement removal and proper disposal of exiting pavement, installing high early concrete and asphalt surface into a properly prepared subgrade, traffic signalization repair, and temporary and permanent striping and markings in accordance with the County requirements and specifications.</p>

BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS <small>Pg 4</small>
9, 10	Reference ID 11.250.xxx Concrete Pavement Replacement (various thickness)
	<p>a. Measurement: Concrete Pavement Replacement shall be measured in actual square yards of concrete removed and replaced. Width of replaced sidewalk shall match that of existing sidewalk. Replaced portions of driveways shall conform to the lines and grades of removed portions of driveways. Scheduled in this bid item is replacement of any devices/structures within and along the work area, including gates, key pads, fences, mailboxes and others. Thickness of pavement shall be as indicated in the plans and specifications.</p> <p>b. Payment: Payment will be made at the contract unit price bid per square yard as stated in the proposal for Concrete Pavement Replacement and shall include all labor, materials, and equipment for saw-cutting, removal and proper disposal of existing concrete, compaction, form work, concrete replacement, restoration, and clean-up for a complete installation.</p>
11	Reference ID 11.260.112 Storm Structure Top and Throat Reconstruction
	<p>a. Measurement: Measurement for Construct Storm Structure Top and Throat shall be made per actual number of storm structure altered / modified necessary for the installation of the new utility.</p> <p>b. Payment: Payment for Storm Structure Top and Throat Reconstruction shall be made based on the authorized quantity at the unit price indicted in the Bid. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials, and equipment necessary for reconstruction of the existing storm structure to current FDOT Design Standards. This includes partial demolition and removal, forming, concreting and grate and/or ring cover and replacement, finishing, restoration and clean up.</p>
12	Reference ID 11.280.xxx Concrete Curb and/or Curb and Gutter Replacement
	<p>a. Measurement: Concrete Curb and/or Curb and Gutter Replacement shall be measured in actual linear feet removed and replaced measured along the centerline of the curb within the excavation of the trench to a maximum width equal to the width of asphalt pavement cut. All additional curb and gutter damaged shall be replaced by the Contractor at his own expense.</p> <p>b. Payment: Payment will be made at the contract unit price bid per linear feet as stated in the proposal for Concrete Curb and Gutter Replacement and shall include all labor, materials, and equipment for saw-cutting, removal and proper disposal of existing concrete curb and gutter, compaction, form work,</p>

	and concrete curb and gutter replacement for a complete installation.
13	Reference ID 11.285.xxx Concrete Handicap Ramp Replacement
	<p>a. Measurement: Concrete Handicap Ramp Replacement shall be measured per actual number of handicap ramps constructed, meeting County and ADA requirements.</p> <p>b. Payment: Payment will be made at the contract unit price bid per each handicap ramp constructed as stated in the proposal for Handicap Ramp Replacement and shall include all labor, materials, and equipment for saw-cutting, removal and proper disposal of existing concrete sidewalk and compaction, form work, and concrete handicap ramp replacement for a complete installation.</p>
BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS <small>Pg 5</small>
	11.3 - Remove/Replace Street Lighting
14	Reference ID 11.350.xxx Remove/Replacement of Existing Street Lighting
	<p>a. Measurement: Street Lighting Replacement shall be measured by the number of street light posts removed and replaced as part of the work. All additional piping, existing curbing or pavement damaged shall be replaced by the Contractor at his own expense.</p> <p>b. Payment: Payment will be made at the contract unit price bid per each light post removed and new post installed as stated in the proposal for Street Lighting Replacement and shall include all labor, materials, and equipment to sheet, shore, and brace; dewater; groundwater treatment and disposal; excavate; remove and properly dispose of existing light post and concrete base and proper installation of a new concrete light post and concrete base in the same location and height as the light post removed. Work includes disconnecting the existing electrical wiring from the existing light post, remove the existing light fixture, disposing of the old light post, purchase and installation of the new light post, reconnect wiring as required per electrical code, reuse of the existing light fixture for a complete installation.</p>
	11.5 – Abandon or Remove Pipe/Structure
15	Reference ID 11.510.xxx Abandon-in-Place Pipe
	___a. Measurement: Abandon-in-Place Pipe, regardless of size and material, shall be measured in actual linear feet satisfactorily abandoned-in—place in

	<p>accordance with the County requirements and specifications (Section 02080). Pipe abandonment shall be measured along the centerline without deduction for valves and fittings.</p> <p>b. Payment: Payment will be made at the contract unit price bid per linear feet as stated in the proposal for Abandon-in-Place Pipe and shall include all labor, materials, and equipment to excavate, backfill and compact; sheet, shore, and brace; dewater; completely drain and properly dispose of pipe contents; grout fill, and plug or cap existing pipes of all services and sizes designated "to be abandoned" on the Drawings. Also included in this item is the removal of existing valve boxes located on valves connected to piping designated to be retired. Valve boxes shall be removed, backfilled and compacted with suitable material.</p>
16	Reference ID 11.530.xxx Remove Existing Water Main
	<p>a. Measurement: Remove Existing Pipe, regardless of size and material, shall be measured in actual linear feet satisfactorily excavated, removed, and salvaged in accordance with the County requirements and specifications (Section 02080). Pipe removal shall be measured along the centerline without deduction for valves and fittings. Also included in this item is the removal and salvage of items including air release valves and vaults, and fire hydrant assemblies.</p> <p>b. Payment: Payment will be made at the contract unit price bid per linear feet as stated in the proposal for Remove Existing Pipe and shall include all labor, materials, and equipment to sheet, shore, and brace; dewater; groundwater treatment and disposal; excavate; completely drain and properly dispose of pipe contents; plug or cap; restoration, sod, clean-up; remove and salvage pipe of all services and sizes designated "to be removed" on the Drawings, backfill and compact. Also included in this item is the removal and salvage of items (as listed in Specification Section 02080) attached to the piping to be removed.</p>

Orange County Utilities	
MEASUREMENT AND PAYMENT ITEMS	
Pg 6	
	12 PRESSURE PIPES
	12.1 - Pressure Pipes with Fittings and Restrained Joints
17, 18, 19, 20, 21	Reference ID 12.110 Water Main Installation (various sizes)
	<p>a. Measurement: Water Main installation regardless of type and size shall be measured in actual linear feet satisfactorily furnished and laid, as measured along the length of the centerline of the completed pipeline, regardless of the</p>

	<p>type of joint required, without deduction for the length of valves and fittings. Pipe included within the limits of lump sum pay items will not be measured for payment under this item.</p> <p>b. Payment: Payment will be made at the contract unit price bid per linear feet as stated in the proposal for Water Main w/Fittings and restrained joints and shall include all labor, materials, and equipment to construct the respective pipeline including coordination with existing utilities, protection of existing utilities including service connections, tree protection, excavation, sheeting, shoring and bracing, dewatering, groundwater treatment and disposal, backfill, compaction, and grading, concrete cap, all testing, potable water system protection, disinfection, restoration, sod and clean-up. This item also includes all necessary fittings, reducers, bends, tees, wyes, plugs, restraining devices, polyethylene encasement where required, metallic tracer wire, line locator, identification markers, and removal and replacement of fences and gates, mailboxes, trees, shrubs, irrigation sprinklers and other obstructions.</p>
22	<p>Reference ID 12.120 Steel Casing Installation (various sizes)</p>
	<p>a. Measurement: Steel Casing installation shall be measured in actual linear feet satisfactorily furnished and laid, as measured along the length of the centerline of the completed pipeline, regardless of the type of joint required. Casing included within the limits of lump sum pay items will not be measured for payment under this item.</p> <p>b. Payment: Payment will be made at the contract unit price bid per linear feet as stated in the proposal for Steel Casing and shall include all labor, materials, and equipment to construct the respective work including coordination with existing utilities, protection of existing utilities including service connections, tree protection, excavation, sheeting, shoring and bracing, dewatering, groundwater treatment and disposal, backfill, compaction, and grading, all testing, potable water system protection. Restoration, sod and clean-up shall be included in the cost for Water Main installation. This item also includes all necessary fittings, restraining devices, polyethylene encasement where required, line locator, identification markers, and removal and replacement of fences and gates, mailboxes, trees, shrubs, irrigation sprinklers and other obstructions.</p>
BID ITEM	<p>Orange County Utilities MEASUREMENT AND PAYMENT ITEMS Pg 7</p>
	12.2 – Valves
23, 24, 26, 26, 27	<p>Reference ID 12.210.xxx Gate Valve with Box (various sizes)</p>
	<p>a. Measurement: Measurement for Gate Valve with Box shall be made per actual number of gate valves with valve boxes satisfactorily furnished and installed complete with covers and concrete collars. Gate valves included</p>

	<p>within tapping sleeve and valve, air release valve assembly, and fire hydrant pay items will not be measured for payment under this item.</p> <p>b. Payment: Payment for the Gate Valve with Box shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment to install the valve, valve box, valve box extensions, operating nut extensions, test station box and cap, valve wrenches, restraining devices, covers, concrete collars, excavation, sheeting, shoring, bracing, dewatering, groundwater treatment and disposal, backfill, compaction, restoration, and all other items required for a complete, acceptable and operable installation.</p>
	12.3 - Tapping Sleeve and Valve Assembly
28, 29, 30, 31	Reference ID 12.310.xxx Tapping Sleeve and Valve Assembly (various sizes)
	<p>a. Measurement: Measurement for Tapping Sleeve and Valve Assembly shall be made per actual number of tapping sleeves and valves satisfactorily furnished and installed to provide a complete and functional unit.</p> <p>b. Payment: Payment for the Tapping Sleeve and Valve Assembly shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment necessary to perform a wet tap to an existing main including excavation, sheeting, shoring, bracing, dewatering, groundwater treatment and disposal, backfill, compaction, grading, tapping sleeve, tapping valve, valve box extensions, operating nut extensions, valve wrenches, restraining devices, protection of potable water system, disinfection, restoration and all other items required for a complete, acceptable and operable installation.</p>
BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS Pg 8
	12.4 – Connections to Existing Mains
32, 33, 34	Reference ID 12.410.xxx Connection to Existing Water Main (various sizes)
	<p>a. Measurement: Measurement for cut-in connections or connection to existing stubs to the existing water main shall be made per number of cut-in connections or connections to existing stubs made complete and in place</p>

	<p>regardless of the size and type from the constructed water main to the existing water main as authorized in the Contract Documents regardless of the depth of the connection.</p> <p>b. Payment: Payment for the Cut-in Connection to the Existing Water Main or Connection to Existing Stub shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials, and equipment to make a connection from the constructed water main to the existing water main including coordination with existing utilities, protection of existing utilities and service connections, excavation, sheeting, shoring and bracing, dewatering, groundwater treatment and disposal, cutting pipe, removing existing cap and plug, completely drain and properly dispose of existing pipe contents, connection to existing main, restraint of existing main in accordance with the County requirements, backfill, compaction, grading, swabbing and disinfection, potable water protection, restoration and clean-up. This item also includes all necessary fittings, reducers, bends, tees, and wyes.</p>
	12.5 - Piping Appurtenances
35, 36, 37, 38, 39	Reference ID 12.510.xxx Line Stop Assembly (various sizes)
	<p>a. Measurement: Measurement for Line Stopping Assembly shall be made per actual number of line stops satisfactorily furnished and installed to permanently or temporarily stop the flow within the indicated main at the locations shown on the Drawings.</p> <p>b. Payment: Payment for the Line Stopping Assembly shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment necessary to perform a permanent or temporary line stop on an existing main including excavation, sheeting, shoring, bracing, dewatering, groundwater treatment and disposal, backfill, compaction, grading, tapping sleeve, plug, restraining devices, restraint of existing piping in accordance with the County requirements, swabbing, restoration and clean-up and all other items required for a complete, acceptable and operable installation.</p>
BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS <small>Pg 9</small>
40	Reference ID 12.540.xxx Fire Hydrant Assembly
	<p>a. Measurement: Measurement for Fire Hydrant Assemblies 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</p>

	<p>unit price, regardless of the length necessary to locate the hydrant at the direction of the County</p> <p>b. Payment: Payment for the Fire Hydrant Assembly shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract 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, groundwater treatment and disposal, backfill, compaction, grading, connection to pipes, restoration, and all other items required for a complete, acceptable and operable installation.</p>
41	Reference ID 12.550.xxx Remove Fire Hydrant Assembly
	<p>a. Measurement: Measurement for removal of existing Fire Hydrant Assemblies shall be made per actual number of fire hydrant assemblies removed. The pipe and necessary restraint system connecting the existing fire hydrant assembly to the water main shall be included in the unit price.</p> <p>b. Payment: Payment for each existing Fire Hydrant Assembly removed shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment necessary to remove the fire hydrant assembly, including the hydrant tee, hydrant extension, pipe, fittings, isolation valve and box, thrust anchorage, and shear pad. Also included are excavation, sheeting, shoring and bracing, dewatering, groundwater treatment and disposal, backfill, compaction, grading, restoration, and all other items required for a complete removal of the existing hydrant assembly.</p>
BID ITEM	Orange County Utilities MEASUREMENT AND PAYMENT ITEMS Pg 10
42, 43, 44	Reference ID 12.560.xxx Water Service Connection (short and long)
	<p>a. Measurement: Measurement for Water Service Connection shall be made per actual number of service connections satisfactorily furnished and installed to provide a complete and functional unit.</p>

	<p>b. Payment: Payment for the Water Service Connection shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit price shall be full compensation for furnishing all labor, materials and equipment necessary to install the water service connection including service saddle, corporation stop, water service piping, curb stops, and installing meter boxes. Payment also includes excavation sheeting, shoring and bracing, dewatering, groundwater treatment and disposal, backfill, compaction, grading, pressure testing, restoration, sod and all other items required for a complete, acceptable and operable installation.</p>
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PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01027
APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 REQUIREMENT

- A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.
- B. Prior to submitting a monthly payment application, the Contractor's progressive As-Built Drawings and As-Built Asset Attribute Data shall be accepted by the County.
- C. Progressive As-Built Drawings shall indicate the horizontal and vertical locations of all current constructed improvements with sufficient information and notes to easily determine if the improvements were constructed in conformance with the Contract Documents. The progressive As-Built Asset Attribute Data Tables shall include a Surveyor's certified statement regarding the constructed improvements being within the specified accuracies or if not, indicating the variances as described in specification Section 01050 "Surveying and Field Engineering", Table 01050-1 Minimum Survey Accuracies.

1.02 FORMAT

- A. Format and Content: Use the accepted Schedule of Values.
 - 1. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:
 - a. Generic name
 - b. Related Specification Section
 - c. Name of Subcontractor
 - d. Name of manufacturer or fabricator
 - e. Name of supplier
 - f. Dollar value
 - 2. Round amounts off to the nearest whole dollar. The total shall equal the Contract Amount.

1.03 PREPARATION OF APPLICATION

- A. Each Application for Payment shall be consistent with previous applications and payments as certified and paid for by the County.
 - 1. The initial Application for Payment: The Application for Payment at time of Substantial Completion and the final Application for Payment involve additional requirements.
- B. Payment Application Times: As stated in the General Conditions, Payment applications

1 are to be submitted monthly on a day of the month to be established by the County at the
2 Pre-Construction conference.

3 C. Application Preparation: Complete every entry on the form, including notarization and
4 execution by person authorized to sign legal documents on behalf of the Contractor.
5 Incomplete applications will be returned without action.

- 6 1. Submit applications typed on forms provided by the County.
- 7 2. Use data on Bid Form and approved Schedule of Values. Provide dollar value in each
8 column for each line item for portion of Work performed and for stored products.
- 9 3. List each authorized Change Order and an extension or continuation sheet, listing
10 Change Order number and dollar amount as for an original item of work.
- 11 4. Each item shall have an assigned dollar value for the current pay period and a
12 cumulative value for the project to-date.
- 13 5. Submit stored material log, partial waivers of claims and mechanic liens, and consent
14 of surety with each application, as further explained below.

15 D. Submit a stored material log with each application for payment which identifies the type,
16 quantity and value of all stored material, and that tracks when the stored materials are
17 installed and deducts them from stored quantity at that time. Include original invoices for
18 all stored materials that payment is requested.

19 E. Waivers of Claims and Mechanics Lien: With each Application for Payment submit
20 waivers of claims and mechanics liens from Subcontractors or Sub-subcontractors and
21 suppliers for the construction period covered by the previous applications.

- 22 1. Submit partial waivers on each item for the amount requested, prior to deduction for
23 retainage, on each item.
- 24 2. When an application shows completion of an item, submit final or full waivers.
- 25 3. The County reserves the right to designate which entities involved in the Work must
26 submit waivers.
- 27 4. Submit final Application for Payment with or preceded by final waivers from every
28 entity involved with performance of work covered by the application that could
29 lawfully be entitled to a payment claim or lien.
- 30 5. Waiver Forms: Submit waivers of claims and lien on forms and executed in a manner
31 acceptable to the County.

32 F. Transmittal: Submit four (4) executed copies of each Application for Payment to the
33 County by means ensuring receipt within 24-hours. One (1) copy shall be complete,
34 including waivers of lien and similar attachments when required.

- 35 1. Transmit each copy with a transmittal form listing attachments, and recording
36 appropriate information related to the application in a manner acceptable to the
37 County.
- 38 2. The Contractor shall include a certification with each application stating that all
39 previous payments received from the County under the Contract have been applied by
40 the Contractor to discharge in full all obligations of the Contractor in connection with
41 the Work by prior applications for payment, and all materials and equipment
42 incorporated into the Work are free and clear of all liens, claims, security interest and
43 encumbrances.

- 1 G. Initial Application for Payment: Administrative actions and submittals that must precede
2 or coincide with submittal of the first Application for Payment include the following:
3 1. List of Subcontractors
4 2. List of principal suppliers and fabricators
5 3. Schedule of Values
6 4. Contractor's Construction Progress Schedule (accepted)
7 5. List of Contractor's staff assignments
8 6. Copies of building permits
9 7. Copies of authorizations and licenses from governing authorities for performance of
10 the Work
11 8. Certificates of insurance and insurance policies
12 9. Performance and Payment bonds (if required)
13 10. Data needed to acquire County's insurance
- 14 H. Monthly Application for Partial Payment: Administrative actions and submittals that
15 must precede or coincide with submittal of Monthly Partial Payments include the
16 following:
17 1. Relevant tests
18 2. Progressive As-builts (one (1) paper copy and electronic copy)
19 3. Table 01050-2 Asset Attribute Data Form Examples (one (1) paper copy and
20 electronic copy)
21 4. Table 01050-3 Pipe Deflection Table Example (one (1) paper copy and electronic
22 copy)
23 5. Table 01050-4 Gravity Main Table (one (1) paper copy and electronic copy)
24 6. An electronic copy of all survey field notes
25 7. Partial Release of lien
26 8. Partial consent of surety
27 9. Site photographs
28 10. Updated Progress Schedule: submit one (1) electronic copy and five (5) copies
29 11. Summary of Values
30 12. Pay Request
31 13. On-Site Storage
- 32 I. Substantial Completion Application for Payment: Following issuance of the Certificate of
33 Substantial Completion, submit an Application for Payment. This application shall
34 reflect any Certificates of Partial Substantial Completion issued previously for County
35 occupancy of designated portions of the Work.
36 1. Administrative actions and submittals that shall precede or coincide with this
37 application include:
38 a. Occupancy permits and similar approvals
39 b. Warranties (guarantees) and maintenance agreements
40 c. Test/adjust/balance records
41 d. Maintenance instructions
42 e. Meter readings
43 f. Start-up performance reports
44 g. Change-over information related to the County's occupancy, use, operation and
45 maintenance

- 1 h. Final Cleaning
- 2 i. Application for reduction of retainage and consent of surety
- 3 j. Advice on shifting insurance coverage
- 4 k. List of incomplete Work, recognized as exceptions to County's Certificate of
- 5 Substantial Completion

6 J. Final Completion Application for Payment: Administrative actions and submittals which
7 must precede or coincide with submittal of the final payment Application for Payment
8 include the following:

- 9 1. Prior to submitting a request for final payment or the County issuing a Certificate of
- 10 Completion for the Work, the Contractor shall submit the final Record Documents to
- 11 the County for approval. Retainage funds will be withheld at the County's discretion
- 12 based on the quality and accuracy of the final Record Documents.
- 13 2. Completion of project close-out requirements
- 14 3. Completion of items specified for completion after Substantial Completion
- 15 4. Assurance that unsettled claims are settled
- 16 5. Assurance that work not complete and accepted is now completed
- 17 6. Transmittal of required project construction records to the County
- 18 7. Proof those taxes, fees and similar obligations have been paid
- 19 8. Removal of temporary facilities and services has been completed.
- 20 9. Removal of surplus materials, rubbish and similar elements
- 21 10. Change of door locks to County's access
- 22 11. Execute certification by signature of authorized officer.
- 23 12. Prepare Application for Final Payment as required in General Conditions.

24 1.04 SUBMITTAL PROCEDURES

- 25 A. Submit four (4) copies of each Application for Payment at time stipulated in Agreement.
- 26 B. Submit under transmittal letter.

27 1.05 SUBSTANTIATING DATA

- 28 A. When the County requires substantiating information, submit data justifying line item
- 29 amounts in question.
- 30 B. Provide one (1) copy of data with cover letter for each copy of submittal. Show
- 31 Application number and date, and line item by number and description.

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

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

34

35 END OF SECTION

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 following specific
11 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, and
16 maintain both a control survey and an as-built survey during construction. The
17 Surveyor will identify control points (monuments and benchmarks noted on the
18 Drawings). The construction layout survey shall be established from the control
19 points shown on the Construction Drawings and confirmed. The method of field
20 staking for the construction of the Work shall be at the option of Contractor. 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. The
23 Contractor shall provide all surveys necessary for the construction of the Work.

24 B. Engineering Services

25 1. 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 2. Engineering related designs, tests and inspections shall be signed by the licensed
31 Professional Engineer as required by the County.

1 1.03 QUALIFICATIONS OF THE SURVEYOR

2 A. The Surveyor, who is proposed by the Contractor to provide services for the Project, is
3 subject to the approval of the County. Prior to any services being performed, the
4 Contractor shall submit the name and address of any proposed Surveyor and a written
5 acknowledgement from the Surveyor stating that he has the hardware, software and
6 adequate scope of services in his agreement with the Contractor to fully comply with the
7 requirements of this specification. These submittals shall be provided to the County prior
8 to Notice to Proceed. It is recommended that the Surveyor attend the Pre-Construction
9 meeting. Any Surveyor, who has not previously performed work for the County shall
10 attend the Pre-Construction meeting.

11 1.04 SUBMITTALS

- 12 A. Provide qualifications of the Surveyor or Engineer.
- 13 1. A Florida Registered Professional Engineer or Registered Surveyor and Mapper, who
14 is proposed by the Contractor to provide services for the Work, shall be acceptable to
15 the County prior to field services being performed.
- 16 2. A Professional Engineer shall be of the discipline required for the specific service for the Work.
- 17 3. Submit name, address and telephone number of the Surveyor and/or Engineer, as
18 appropriate to the County for acceptance before starting survey or engineering work.
- 19 B. On request, submit documentation verifying accuracy of survey work.
- 20 C. Surveyor shall certify all elevations and locations included in Table 01050- 2, 3, and 4.

21 **PART 2 - PRODUCTS**

22 2.01 SURVEY DOCUMENTS

- 23 A. Survey documents shall comply with the Minimum Technical Standards of Chapter 5J-17
24 of the Florida Administrative Code (FAC) and Table 01050-1 Minimum Survey
25 Accuracies, whichever are more stringent. All coordinates shall be geographically
26 registered in the Florida State Plan Coordinate System using the contract Drawings
27 control points for horizontal and vertical controls.
- 28 B. The Surveyor shall not copyright any of their Work related to this project.
29

**Table 01050-1
Minimum Survey Accuracies**

Asset	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
Mains at 100-foot maximum intervals	0.1	0.1	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing
PVC pipe >16-inch at every pipe joint	0.1	0.1	Pipe, Pipe at Valves, Pipe at Bore & Jack Casing
Fittings, Sleeve, Tapping Saddle, and end of the pipe if Plugged or Capped.	0.1	0.1	Fitting
Restrained Pipe	0.1	N/A	Restrained Joint Limits
Connections	0.1	0.1	Pipe
Bore & 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
Hydrants	0.1	N/A	Operating Nut of Hydrant
Valves	0.1	0.1	Operating Nut
Air Release, Blow off, and Backflow Valves	0.1	N/A	Valve Enclosure
Master Meters, Deduct Meters & Wastewater Meters	0.1	N/A	Register
Meter Box	0.1	N/A	Meter Box
Clean out	0.1	N/A	Clean out
Manhole Rim	0.1	0.1	Manhole
Manhole Inverts	N/A	0.01	Pipe Inverts
Pump Station (Public & Private)	0.1	0.01	Wetwell and Pipe Inverts
Production Well or Monitoring Well	0.1	0.1	Well
Grease Interceptor	0.1	0.1	
Oil / Water Separators	0.1	0.1	
Demolished Pipe (abandoned in place or removed)	0.1	0.1	Limits of Abandoned or Removed Pipe
Existing Utilities water, wastewater, reclaimed water, and appurtenant structures **	0.1	0.1	Pipe or Structure
* Shall conform to the requirements of the "Chapter 5J-17, 'Minimum Technical Standards', FAC", certified by a SURVEYOR.			
** Existing utilities including but not limited to water, wastewater, reclaimed water, stormwater, fiber optic cable, electric, gas and structures within the limits of construction.			

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TABLE 01050-2
Asset Attribute Data Form Examples

Hydrants Worksheet

	A	C	D	E	F	G	H	I
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Manufacturer	Model #	Comments
2	FH-1	C-7	518456.40	1483743.63	49.53	Brand B	XJ7-B	
3	FH-2	C-9	518477.68	1483758.95	54.23	Brand B	XJ7-B	

Valves Worksheet

	A	C	D	E	F	G	H	I	J
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Valve Type	Main Type	Valve Size	Valve Manufacture
2	ARV-1	C301	518060.09	1483231.33	81.72	ARV - Combination	Water Main	2	Brand H
3	ARV-1	C303	518083.55	1483280.50	81.15	ARV - Vacuum	Force Main	4	Brand G
4	BFP-1	C303	518086.00	1483282.88	78.21	Backflow Preventer	Reclaimed Water Main	8	Brand F
5	BO-9	C405	518088.83	1483289.43	78.20	Blowoff	Water Main	2	Brand E
6	BFV-1	C405	518088.11	1483295.00	81.95	Butterfly	Water Main	30	Brand D
7	GV-3	C405	518132.54	1483372.75	81.23	Gate	Water Main	16	Brand C
8	LS-W1	C405	576779.36	1539706.97	64.30	Line Stop	Water Main	16	Brand B
9	PV-22	C405	576880.60	1539718.32	64.52	Plug	Force Main	12	Brand A

	J	K	L	M	N	O	P	Q
1	Valve Manufacturer	Valve Model #	# of Turns to Close	Gear Actuator	Gear Ratio	Side Actuator	uator Manufact	Comments
2	Brand H	100XT						
3	Brand G	1000						
4	Brand F	2000 fgs						
5	Brand E	14 turbo						
6	Brand D	230 xls	200	Yes	3 to 1	Yes	Brand C	
7	Brand C	2225846	300	Yes	3 to 1	NO		
8	Brand B	7n6r44						
9	Brand A	Z100	200	Yes	3 to 1	Yes	Brand A	

Manhole Worksheet

	A	C	D	E	F	G	H	I	J	K	L	M	N	O
1	ID Number	Plan Sheet #	Easting	Northing	Rim Elevation	Invert Elv II	Invert Elv IE	Invert Elv E	Invert Elv SE	Invert Elv S	Invert Elv SW	Invert Elv W	Invert Elv IW	Manufacturer
2	MH-1	C-20	517999.15	1483092.24	82.96	76.96		76.96						Brand X
3	MH-2	C-20	517999.15	1483492.24	83.54	75.63				75.58				Brand X

Meter Worksheet

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Comments
2	MM-1	C-6	576533.64	1539520.08	58.01	Water Main	
3	RWMM-1	C-6	576937.42	1539598.78	64.84	Reclaimed Water Main	

1 Fitting Worksheet

	A	C	D	E	F	G	H	I
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Fitting Type	Comments
2	FM-1	C-3	572399.28	1539339.13	46.27	Force Main	Bend 11 1/4°	
3	FM-2	C-3	574840.74	1539856.91	51.73	Force Main	Bend 22-1/2°	
4	FM-3	C-3	574844.01	1539856.71	52.48	Force Main	Bend 45°	
5	FM-4	C-3	574845.72	1539856.61	52.33	Water Main	Bend 90°	
6	FM-5	C-3	574845.85	1539858.77	51.98	Water Main	Cap	
7	RW-1	C-4	574884.06	1539849.64	51.75	Reclaimed Water Main	Cross	
8	RW-2	C-4	574887.22	1539849.56	48.98	Reclaimed Water Main	Reducer	
9	RW-3	C-4	574904.30	1539849.10	49.39	Reclaimed Water Main	Plug	
10	RW-4	C-4	574907.42	1539849.01	52.32	Reclaimed Water Main	Sleeve	
11	WM-1	C-5	574938.65	1539848.16	54.42	Water Main	Tapping Saddle	
12	WM-2	C-5	572532.38	1539337.10	45.27	Water Main	Tee	
13	WM-3	C-5	572631.00	1539338.00	44.13	Water Main	Wye	
14	WM-4	C-5	572731.00	1539334.00	43.77	Water Main	Tapping Sleeve	

3 Cleanout Worksheet

	A	C	D	E	F	G
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
2	CO-1	C-6	576533.64	1539520.08	58.01	
3	CO-2	C-6	576937.42	1539598.78	64.84	

5 Pipes Worksheet

	A	C	D	E	F	G	H	I	J	K	L
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Main Type	Type of Shot	Instruction Method	Material	Pressure Class	Manufacturer
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	517732.848	1482338.1	80.943	Reclaimed Water Main	Restraint Joint Limit	Open Cut	DIP	Class 250	Brand B
6	WM-1	C-9	573309.068	1539372.9	56.10	Water main	Shot on Pipe	Open Cut	PVC	DR18	Brand C
7	WM-2	C-9	573308.752	1539375	54.66	Water main	Shot on Pipe	Open Cut	PVC	DR18	Brand C
8	FMDD-1	C-4	504345.94	1488969.2	114.14	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X
9	FMDD-2	C-4	504360.86	1488970.5	112.74	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X
10	FMDD-3	C-4	504377.19	1488971.2	106.14	Force Main	Shot on Pipe	Directional Drill	HDPE	DR17	Brand X
11	FM-9	C-4	504480.47	1488982.9	105.24	Force Main	Shot on Pipe	Open Cut	PVC	DR18	Brand C

7 Well Worksheet

	A	C	D	E	F	G
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Comments
2	PS-1	C-40	517914.346	1482906.562	83.912	

1 Easements Worksheet

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Boundary Corner Type	Comments
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	

2

3 Existing OC Utility Crossing

	A	C	D	E	F	G	H	I
1	ID Number	Plan Sheet #	Easting	Northing	Existing Pipe Elevation	Proposed Crossing Elevation	Existing Main Type	Comments
3	Conf-1	C-750	463464.47	1511013.75	100.54	104.88	Water main	
4	Conf-2	C-750	463163.91	1510693.49	98.32	103.57	Storm Main	

4

5 Grease Interceptor

	A	C	D	E	F	G	H
1	ID Number	Plan Sheet #	Easting	Northing	Elevation	Volume (Gallons)	Comments
2	GI-1	C-400	508387.3	1487203.18	89.70	1000.00	

6

7

8 For ease of calculating pipe deflections in Table 01050-3, begin by providing a unique asset ID
 9 (top of pipe shots and fittings) for each utility and type, numbered sequentially along the pipe run
 10 (including changes in direction) from start to finish of the pipe in the Table 01050-2. Then
 11 branches and services of the same utility type can be numbered. It is recommended that each
 12 utility (water, wastewater or reclaimed water) numbering format be distinguishable from the
 13 other. This will allow organization and convenient sorting after the individual asset table
 14 worksheet tabs are combined in the spreadsheet program prior to copying and pasting to the
 15 deflection table spreadsheet.

16

17

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**TABLE 01050-3
PIPE DEFLECTION TABLE 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.
 $\text{Since } \sin((\phi/2) * (\pi/180)) = (\text{Chord}/2) / R \text{ and length } AC = \text{Chord}$
 $R = AC / (2 * \sin(\phi * \pi / 360))$
 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
5

1 **PART 3 - EXECUTION**

2 3.01 SURVEY FIELD WORK

- 3 A. Locate, reference, and preserve existing horizontal and vertical control points and
4 property corners shown on the Drawings prior to starting any construction work. If the
5 Surveyor performing the Work discovers any discrepancies that will affect the Project,
6 the Contractor must immediately report these findings to the County. All survey work
7 shall meet the requirements as defined in Florida Administrative Code 5J-17. Reference
8 and preserve all survey points during Construction. If survey points are disturbed, it is the
9 responsibility of the Contractor's Surveyor to reset the points at the Contractor's expense.
10 Copies of the Surveyor's field notes and/or electronic files for point replacement shall be
11 provided to the County.
- 12 1. The Surveyor shall locate all improvements for the project As-Built Asset Attribute Data
13 using State Plane Coordinates as the horizontal datum and the benchmark referenced on
14 the Drawings as the vertical datum. The County will provide electronic files of the
15 Drawings to be used by the Surveyor in complying with these specifications.
- 16 2. The construction layout shall be established from the reference points shown or listed
17 on the Drawings. The accuracy of any method of staking shall be the responsibility of
18 the Contractor. All construction layout staking shall be done such as to provide for
19 easy verification of the Work by the County.
- 20 B. Only a Surveyor licensed in the State of Florida shall be employed for this Work. All
21 control points shall be protected by the Contractor from disturbance. If the monuments
22 are disturbed, any Work that is governed by these monuments shall be held in abeyance
23 until the monuments are reestablished by the Contractor and approved by the County.
24 The accuracy of all the Contractor's stakes, alignments and grades is the responsibility of
25 the Contractor. However, the County has the discretionary right to check the Contractor's
26 stakes, alignments, and grades at any time.
- 27 C. Use survey control points to layout such work tasks including but not limited to:
28 1. Clearing, grubbing, work limits, right-of-way lines and easements
29 2. Locations for pipelines and all associated structures and appurtenances
- 30 D. The Surveyor shall reference and replace any project control points, boundary corners,
31 benchmarks, section corners, and right-of-way monuments that may be lost or destroyed,
32 at no additional cost to the County. Establish replacement points based on the original
33 survey control. Copies of all reference field notes and/or electronic files for point
34 replacement shall be submitted to the County.

1 3.02 SURVEYING

- 2 A. Locate and protect existing horizontal and vertical control points shown on the
3 construction Drawings prior to starting any work. If the Surveyor performing the Work
4 finds differences that will effect the Work, the Contractor must immediately report the
5 findings to the County. Establish control points, lines and levels by instrumentation and
6 similar appropriate means. The location of these points should minimize the number of
7 sightings necessary to control the Work and the likelihood of the points being disturbed.
8 Preserve and reference all permanent reference points during Construction. If permanent
9 reference points are disturbed, it is the responsibility of the Contractor's Surveyor to reset
10 the points at the Contractor's expense. Copies of the Surveyor's field notes shall be
11 provided to the County.
12 1. Record locations, with horizontal and vertical data, on project As-Built survey.
13 2. Make no changes or relocations without prior written notice to the County or without
14 receipt of written approval from the County.
15 3. Report to the County when any control point is lost or destroyed or requires
16 relocation because of necessary changes in grades or locations.
- 17 B. Cover for water, reclaimed water and force mains shall vary to provide long uniform
18 gradient or slope to pipe to minimize air pockets and air release valves. The locations
19 shown on the Drawings for air and vacuum release valve assemblies are approximate and
20 the Contractor shall field adjust these locations to locate these valves at the highest point
21 in the pipeline installed.
- 22 C. To insure a uniform gradient for gravity pipe and pressure pipe, all lines shall be installed
23 using the following control techniques as a minimum:
24 1. Gravity lines: Continuous control, using laser beam technology,
25 2. Pressure lines: Control stakes set at 50 ft. intervals using Surveyor's level instrument.

26
27 3.03 SURVEY DOCUMENTS

- 28
29 A. The Tables 01050-2 Asset Attribute Data, 01050-3 Pipe Deflection Table, and 01050-4
30 Gravity Main Table shall be signed, sealed and dated by the Surveyor with each pay
31 request as specified in Section 01027 "Application for Payment" and the requirements of
32 Section 01720 "Project Record Documents."
33

34
END OF SECTION

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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 governmental 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 in Appendix C "Permits Obtained by County" of these specifications.
5. Unless otherwise specified, the cost of work specified in the various sections of Division 1, will not be paid for separately but the cost therefore shall be considered incidental to and included in the bid prices of the various Contract items.

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 for the issuance of that permit only.
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.

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

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

3

4

5 **END OF SECTION**

1 **SECTION 01070**

2 **ABBREVIATIONS AND SYMBOLS**

3 **PART 1 - GENERAL**

4 1.01 REQUIREMENTS INCLUDED

- 5 A. Reference to the following standards of any technical society, organization or body shall
6 be construed to mean the latest standard, code or specification or tentative specification
7 adopted and published at the date of advertisement for bids, even though reference has
8 been made to an earlier standard. Such reference is hereby made a part of the Contract
9 the same as if herein repeated in full and in the event of any conflict between any of these
10 specifications, standard codes or tentative specifications and the Contract Documents, the
11 most stringent shall govern.
12

AA	Aluminum Association
AASHTO	American Association of State Highway and Transportation Officials
ABPA	Acoustical and Board Products Association
ACI	American Concrete Institute
AFBMA	Anti-Friction Bearing Manufacturer's Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AI	The Asphalt Institute
AIA	American Institute of Architects
AIEE	American Institute of Electrical Engineers
AIMA	Acoustical and Insulating Materials Association
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	American Moving and Conditioning Association
ANSI	American National Standards Institute
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASA	American Standards Association (now ANSI)
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
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWBP	American Wood Preservers Board
AWS	American Welding Society
AWWA	American Water Works Association

CRSI	Concrete Reinforcing Steel Institute
CS	Commercial Standard
DOT Spec	Standard Specification for Road and Bridge Construction –
FDOT	Florida Department of Transportation
FAC	Florida Administrative Code
FS	Federal Standard
IEEE	Institute of Electrical and Electronic Engineers
IPCEA	Insulated Power Cable Engineers Association
NACE	National Association of Corrosion Engineers
NASSCO	National Association of Sewer Service Companies
NBFU	National Board of Fire Underwriters
NBS	National Bureau of Standards
NEC	National Electrical Code
NECA	National Electrical Contractor's Association
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPT	National Pipe Threads
NSF	National Science Foundation
OSHA	U.S. Department of Labor, Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Prestressed Concrete Institute
PS	United States Products Standards
SAE	Society of Automotive Engineers
SDI	Steel Decks Institute
SJI	Steel Joists Institute
SMACNA	Sheet Metal and Air Conditioning Contractors National Association
SSPC	Structural Steel Painting Council
UL	Underwriter's Laboratories, Inc.
USASI	United States of American Standards Institute (Now ANSI)

1 B. UNITS OF MEASUREMENT
2

CU FT	cubic feet
CU IN	cubic inch(es)
CY	cubic yard(s)
DegC	degree(s) Centigrade
DegF	degree(s) Fahrenheit
F	Fahrenheit
FT	feet, foot
G	gram(s)
GA	gage
GAL	gallon(s)
GPH	gallon(s) per hour
GPM	gallon(s) per minute

GPS	gallon(s) per second
HR	hour(s)
IN	inch(es)
IPS	iron pipe size
KG	kilogram(s)
L	liter(s)
LB	pound(s)
LBF-IN	pound (force) inch
LF	linear foot, linear feet
MIN. min.	minute(s), minimum
ml	milliliter
MO	month(s)
OZ	ounce(s)
QT	quart
RH	relative humidity
SF	square foot, square feet
SQ IN	square inch(es)
YD	yard(s)
YR	year(s)

1 C. TERMINOLOGY

@	at
AB	anchor bolt
ADJ	adjust, adjustable
ADMIN	administration
AFG	above finished grade
AGGR	aggregate
AL	aluminum
ALT	alternate
APPX	appendix
APX	approximate
ART	article
ASPH	asphalt
ASSY	assembly
AUTO	automatic
AUX	auxiliary
AVE	avenue
AVG	average
AWG	American Wire Gauge
BAR	barrier
BCCMP	bituminous coated corrugated metal pipe
BL	base line
BLDG	building
BLKG	blocking
BM	beam

C to C	center to center
CCB	concrete block, masonry
CEM	cement
CIP	cast iron pipe, cast in place
CJ	construction joint
CL	center line, clearance
CM	Construction Manager
CMP	corrugated metal pipe
CO	cleanout
CONC	concrete
CONN	connection
CONST	construction
CONT	continuous
CONTR	contractor
CU, COP	copper
ORR	corridor
CRIT	critical
CTD	coated
CTR	center
CULV	culvert
d	delta
DBL	double
DEM	demolition, demolish
DEPT	department
DET	detail
DIA, D	diameter
DIAG	diagonal
DIM	dimension
DWG	drawing
FEM	female
FUT	future
FV	field verify
FM	force main
FH, HYD	fire hydrant
ID	inside diameter
MAS	masonry
MATL	material
MAX	maximum
MFD	manufactured
MFG	manufacturing
MFR	manufacturer
MH	manhole, metal hallide
MIN	minimum
MISC	miscellaneous
MTL	material

NAT	natural
NATL	national
NOM	nominal
NTS	not to scale
OD	outside diameter
PP	power pole
R	radius
Rd	road
REIN	reinforce
REL A	relief air
REQD	required
REV	revision
RR	railroad
R/W	right-of-way
RWM	reclaimed water main
RY	railway
SAN	sanitary
SCH	schedule
SECT	section
SLV	sleeve
SQ	square
SST	stainless steel
ST	street
STA	station
STD	standard
SURF	surface
SUSP	suspend(ed)
SYM	Symbol, symmetrical
SYS	system
TEMP	Temperature, temporary
TYP	typical
UTIL	utility
W	West
WLD	welded
WM	water main
W/O	without
WT	weight
YD	yard
YR	year
Y W	wye

1

END OF SECTION

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1 D. Applicable Standard Specifications: The Contractor shall construct the Work specified
2 herein in accordance with the requirements of the Contract Documents and the referenced
3 portions of those referenced codes, standards, and specifications listed.

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

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

6 END OF SECTION

- 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 will schedule progress meetings every month and as required by progress of
36 the Work with the first meeting (one) 1-month after the pre-construction meeting. The
37 Contractor will prepare and distribute the meeting minutes within 7 calendar days.

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.
- 18 G. Suggested Agenda:
19 1. Review and approve minutes from previous meeting
20 2. Review of Work progress since previous meeting to include current As-Builts
21 3. Contractor's/Subcontractor's workforce and equipment
22 4. Progressive As-Built Drawings
23 5. Surveyor's submittals
24 a. As-Built Asset Attribute Data Table (see Table 01050-2)
25 b. Pipe Deflection Table (see Table 01050-3)
26 c. ~~Gravity Main Table (see Table 01050-4)~~
27 6. Field observations, problems and conflicts
28 7. Construction progress and problems which impede construction schedule
29 8. Shop Drawing submittal status
30 9. Requests for Information (RFI) status
31 10. Change order status
32 11. Review of off site fabrication and delivery schedules
33 12. Corrective measures and procedures to regain approved schedule
34 13. Revisions to construction schedule
35 14. Job progress and schedule for succeeding work period
36 15. Coordination of schedules
37 16. Maintenance of quality standards
38 17. Review submittal schedule; expedite as required
39 18. Pending requests for information, changes and substitutions
40 19. Review proposed changes for effect on construction schedule and completion date
41 20. Pay application status
42 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

1 **SECTION 01300**

2 **SUBMITTALS**

3 **PART 1 - GENERAL**

4 Work completed without approved Shop Drawings and/or samples shall be considered
5 installed at the Contractor's risk.

6 1.01 SHOP DRAWINGS AND DATA

7 A. Shop Drawings defined in the General Conditions, shall complement design and
8 construction Drawings, and shall contain sufficient detail to clearly define all aspects of
9 the Construction. These Drawings shall be complete and detailed.

10 B. Contractor and Supplier's catalog sheets, brochures, diagrams, illustrations and other
11 standard descriptive data shall be clearly marked with specification title and numbers to
12 identify pertinent materials, product or models. Delete information which is not
13 applicable to the Work by striking or cross-hatching.

14 C. If Shop Drawings show variations from Contract requirements because of standard shop
15 practice or for other reasons, the Contractor shall describe such variations in the letter of
16 transmittal. If acceptable, proper adjustment in the Contract shall be implemented where
17 appropriate. If the Contractor fails to describe such variations, the Contractor shall not be
18 relieved of the responsibility for executing the Work in accordance with the Contract,
19 even though such Drawings have been reviewed.

20 D. Data on materials and equipment shall include, without limitation, materials and
21 equipment lists, catalog data sheets, cuts, performance curves, diagrams, verification of
22 conformance with applicable standards or codes, materials of construction and similar
23 descriptive material. Materials and equipment list shall, for each item, give the name and
24 location of the Supplier or manufacturer, trade name, catalog reference, size, finish and
25 all other pertinent data.

26 E. For all equipment furnished, the Contractor shall provide a list including the equipment
27 name and address and telephone number of the Supplier's representative and service
28 company so that service and/or spare parts can be readily obtained.

29 F. The Contractor will obtain an installation list from suppliers and equipment suppliers
30 who propose to furnish equipment or products for submittal to County/Professional along
31 with the required Shop Drawings. The installation list shall include at least 5 installations
32 where identical equipment has been installed and has been in operation for a period of at
33 least 1-year.

1 1.02 REVIEW OF SHOP DRAWINGS AND SAMPLES

- 2 A. The County /Professional's review of Shop Drawings, Data, and Samples as submitted by
3 the Contractor will be to determine if the items(s) generally conform(s) to the information
4 in the Contract Documents and is/are compatible with the design concept. The
5 County/Professional's review and exceptions, if any, will not constitute an approval of
6 dimensions, connections, quantities, and details of the material, equipment, device, or
7 item shown.
- 8 B. The review of drawings and schedules will be general, and shall not be construed:
9 1. As permitting any departure from the Contract Documents
10 2. As relieving the Contractor of responsibility for any errors, including details,
11 dimensions, and materials
12 3. As approving departures from details furnished by the County/Professional, except as
13 otherwise provided herein
- 14 C. If the drawings or schedules as submitted describe variations and show a departure from
15 the Contract Documents which the County/Professional finds to be in the interest of the
16 County and to be so minor as not to involve a change in Contract Price or Contract Time,
17 the County/Professional may return the reviewed drawings without noting an exception.
- 18 D. "Approved As Noted": Contractor shall incorporate County/Professional's comments into
19 the submittal before release to manufacturer. The Contractor shall send a letter to the
20 County/Professional acknowledging the comments and their incorporation into the Shop
21 Drawing.
- 22 E. "Amend and Resubmit": Contractor shall resubmit the Shop Drawing to the
23 County/Professional. The resubmittal shall incorporate the County/Professional's
24 comments highlighted on the Shop Drawing.
- 25 F. "Rejected": Contractor shall correct, revise and resubmit Shop Drawing for review by
26 County/Professional.
- 27 G. Resubmittals will be handled in the same manner as first submittals. For resubmittals the
28 Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to
29 revisions other than the corrections requested by County/Professional on previous
30 submissions. The Contractor shall make any corrections required by the
31 County/Professional.
- 32 H. If the Contractor considers any correction indicated on the Drawings to constitute a
33 change to the Drawings or Specifications, the Contractor shall give written notice thereof
34 to the County/Professional.

- 1 I. When the Shop Drawings have been completed to the satisfaction of the
2 County/Professional, the Contractor shall carry out the Construction in accordance
3 therewith and shall make no further changes therein except upon written instructions
4 from the County/Professional.
- 5 J. No partial submittals will be reviewed. Submittals not deemed complete will be stamped
6 "Rejected" and returned to the Contractor for resubmittal. Unless otherwise specifically
7 permitted by the County/Professional, make all submittals in groups containing all
8 associated items for:
9 1. Systems
10 2. Processes
11 3. As indicated in specific Specifications Sections
12 All drawings, schematics, manufacturer's product data, certifications, and other Shop
13 Drawing submittals required by a system specification shall be submitted at one time
14 as a package to facilitate interfaces checking.
- 15 K. Only the County/Professional shall utilize the color "red" in marking Shop Drawing
16 submittals.
- 17 L. Failure to comply with any of the above may result in the rejection of Shop Drawings.

18 1.03 PRODUCT DATA

- 19 A. Submit not less than 6-copies, unless approved by the County/Professional. Mark each
20 copy to identify applicable products, models, options and other data. Supplement
21 manufacturers' standard data to provide information unique to the Work.

22 1.04 MANUFACTURERS' INSTRUCTIONS

- 23 A. When required in an individual Specification Section, submit manufacturer's printed
24 instructions for delivery, storage, assembly, installation, start-up, adjusting and finishing,
25 in quantities specified for product data.

26 1.05 SAMPLES

- 27 A. Submit full range of manufacturers' standard colors, textures and patterns for the County's
28 selection. Submit samples for selection of finishes within 30-days after Award of
29 Contract. All color and finish selections must be submitted by the Contractor in a single
30 submission, properly labeled and identified.
- 31 B. Submit samples to illustrate functional characteristics of the product, with integral parts
32 and attachment devices. Coordinate submittal of different categories for interfacing
33 work.

- 1 C. Submit the number of samples specified in the respective Specification section, but no
2 less than two (2). After review one (1) will be retained by the County. Reviewed
3 samples that may be used in the Work are indicated in the Specification Section.
- 4 D. Samples shall be delivered to the County as directed. The Contractor shall prepay
5 shipping charges on samples. Materials or equipment for which samples are required
6 shall not be used in the Work until approved by the County/Professional.
- 7 E. Samples shall be of sufficient size to clearly illustrate:
8 1. Functional characteristics of the product, with integrally related parts and attachment
9 devices
10 2. Full range of color, texture and pattern
11 3. Each sample shall have a label indicating:
12 a. Name of Project
13 b. Name of Contractor and Subcontractor
14 c. Material or equipment represented
15 d. Place of origin
16 e. Name of product and brand (if any)
17 f. Location in Project
18 g. Specification title and number
19 h. Submittal number
20 i. Note: Samples of finished materials shall have additional marking that will
21 identify them under the finished schedules.
- 22 F. The Contractor shall prepare a transmittal letter, in triplicate (3) for each shipment of
23 samples containing the information required in paragraph herein. The Contractor shall
24 enclose a copy of this letter with the shipment and send a copy of this letter to the
25 County/Professional. Approval of a sample shall be only for the characteristics or use
26 named in such approval and shall not be construed to change or modify any Contract
27 requirements.
- 28 G. Approved samples not destroyed in testing shall be sent to the County or stored at the site
29 of the Work. Approved samples of the hardware in good condition may be incorporated
30 in the Work if requested in writing by the Contractor and approved in writing by the
31 County/Professional. Samples that failed testing or were not approved will be returned to
32 the Contractor at the Contractor's expense, if so requested at time of submission.

33 1.06 FIELD SAMPLES

- 34 A. Provide field samples of finishes as required by individual Specifications sections. Install
35 the sample completely and finished. Acceptable samples in place may be retained in
36 completed Work.

37 1.07 DRAWINGS, PRODUCT DATA AND CERTIFICATES

- 38 A. Each letter of transmittal shall identify each and every item transmitted by title, drawing
39 number, revision number and date.

- 1 B. The County generally will not check dimensions, quantities or schedules, except in cases
2 where the information is lacking in the Specifications.
- 3 C. The following is applicable to submitted drawings, data and certificates:
4 1. Show relation to adjacent structures or materials.
5 2. Clearly identify field dimensions.
6 3. Show required dimensions and clearances.
7 4. Performance characteristic and capabilities shall accompany original Shop Drawing
8 submittals.
9 5. Wiring diagrams and controls shall accompany original Shop Drawing submittals.
10 6. Installation instructions shall accompany original Shop Drawing submittals.
11 7. Each submittal shall identify applicable Standards, such as ASTM number or Federal
12 Specification number.
13 8. All information not pertinent shall be removed from the submittal, or shall be crossed
14 out.
- 15 D. When resubmission is required, the County/Professional will return only two (2) marked
16 up copies. A third submission from the same manufacturer will not be accepted.

17 1.08 SUBSTITUTIONS

- 18 A. The substitution requirements of this Section are in addition to the requirements of the
19 General Conditions and Supplementary Conditions.
- 20 B. When a particular product is specified or called for, it is intended and shall be understood
21 that the proposal tendered by the Bidder includes those products in his Bid. Substitutions
22 will only be considered in cases where original materials are unavailable or in an instance
23 where substitute can be proven superior in its planned application
- 24 C. The intent of these specifications is to provide the County with a quality facility without
25 discouraging competitive bidding. For products specified only by reference standards,
26 performance and descriptive methods, without naming manufacturer's products, the
27 Contractor may provide the products of any manufacturer complying with the Contract
28 Documents, subject to the review of product data by the County/Professional as specified
29 herein.
- 30 D. The County/Professional's approval is required for substitutions.
- 31 E. The Contract is based on the materials, equipment and methods described in the Contract
32 Documents.
- 33 F. The County/Professional will consider proposals for substitution of materials equipment
34 and methods only when such proposals are accompanied by full and complete technical
35 data and all other information required by the County/Professional to evaluate the
36 proposed substitution.

1 G. Do not substitute materials, equipment or methods unless such substitution has been
2 specifically approved for this Work by the County/Professional in writing. The
3 Contractor must provide a submittal per this Section specifically requesting approval of
4 the substitution. Failure to specifically identify the requested substitution may invalidate
5 approval of a submittal.

6 1.09 AVAILABILITY OF SPECIFIED ITEMS

7 A. Verify prior to bidding that all specified items will be available in time for installation
8 during Construction for orderly and timely progress of the Work.

9 B. In the event that specified items will not be available, notify the County/Professional
10 prior to receipt of proposals.

11 1.10 OPERATING MANUALS

12 A. Submit all manuals in accordance with requirements of Divisions 2 through 16 of the
13 Contract Specifications and Section 01700 "Project Closeout."

14 1.11 WARRANTIES, GUARANTEES AND BONDS

15 A. Provide as required by Technical Sections of the Specifications and Sections 01700
16 "Project Closeout" and Section 01740 "Warranties and Bonds."

17 1.12 CADD FILES

18 A. The Professional's CADD files will be available on a limited basis to qualified firms at
19 the County's prerogative. The procedure for requesting such files is noted elsewhere in
20 these documents and there is a cost associated with handling and reproduction.
21 Recipients are cautioned that these files may not accurately show actual conditions as
22 constructed. Users are responsible to verify actual field conditions.

23 B. The Professional's Drawings are to be used only for background information. If the
24 Professional's Drawings are just reproduced and resubmitted (e.g. for ductwork
25 drawings) they will be rejected.

26 C. Copies of data furnished by the County/Professional to Contractor or Contractor to
27 County/Professional that may be relied upon are limited to the printed copies (also known
28 as hard copies). Files in electronic media format of text, data, graphics, or other types are
29 furnished only for the convenience of the receiving party. Any conclusion or information
30 obtained or derived from such electronic files will be at the user's sole risk. If there is a
31 discrepancy between the electronic files and the hard copies, the hard copies govern.

- 1 D. Because data stored in electronic media format can deteriorate or be modified
2 inadvertently or otherwise without authorization of the data's creator, the party receiving
3 electronic files agrees that it will perform acceptance tests or procedures within 60-days,
4 after which the receiving party shall be deemed to have accepted the data thus
5 transferred. Any errors detected within the 60-day acceptance period will be corrected by
6 the transferring party.
- 7 E. When transferring documents in electronic media format, the transferring party makes no
8 representations as to long-term compatibility, usability, or readability of documents
9 resulting from the use of software application packages, operating systems, or computer
10 hardware differing from those used by the data's creator.

11 1.13 PROGRESS PHOTOGRAPHS

- 12 A. Photographs and digital pictures shall be in color. Provide 1 copy of each digital picture
13 on each of three (3) CDs and provide 1 print of each photograph in two (2) separate
14 albums.
- 15 B. Photographs shall be from locations to illustrate the condition of Construction and state
16 of progress adequately.
- 17 C. Provide up to 12 digital photographs of views randomly selected by the County, taken
18 prior to any construction and prior to each scheduled Application for Payment.
- 19 D. Deliver electronic images, prints, and negatives to the County.
- 20 E. Each print shall be single weight paper with glossy finish and the overall dimension shall
21 be 7-1/2-inch x 10-inches (19.05 x 25.4 cm). The print shall be clear, sharp and free of
22 distortion after the enlargement from the negative.
- 23 F. Provide loose-leaf albums for each set of photographs to hold prints with a maximum of
24 50-leaves per binder.
- 25 G. Each print shall be protected by flexible, transparent acetate or plastic sheet protector
26 leaves with metal reinforced holes. Two (2) extra leaves shall be provided in each
27 binder.
- 28 H. Capture and provide digital, ortho-rectified, true-color, aerial photographs of the
29 complete project site prior to start of Construction and at final completion. A final 6-inch
30 or less ground pixel resolution is required. If using traditional photography, the photos
31 will need to be captured at an appropriate scale and scanned at a high enough dpi to yield
32 a final ground pixel size of 6-inches or less. If captured digitally, a final 6-inches or less
33 ground sample distance is required. The final orthorectified photos shall use a projection
34 of NAD 27, State Plane West and all vertical reference shall be NAVD 88, US feet. All
35 orthophoto mosaics shall meet a final accuracy of plus or minus 5-feet.

- 1 I. Provide a total of four (4) true-color, color balanced orthophoto mosaic prints. Three (3)
2 prints each of the pre and post construction (final completion) orthophoto mosaics, for a
3 total of six (6). Each orthophoto mosaic print shall be on double-weight paper with
4 glossy finish and shall have overall dimensions of 36-inches x 58-inches. Two (2) copies
5 of each of the digital orthophoto mosaics shall be supplied in Geotiff format on disk for
6 each time period (pre and post construction). The final color balanced, true-color
7 orthophoto mosaics will be projected in NAD 27, State Plane West and all vertical
8 reference shall be NAVD 88, US feet and shall meet a final accuracy of plus or minus 5-
9 feet.
- 10 J. The Contractor shall provide before and after photographs of each portion of the site.
11 The below ground facilities shall include all equipment, walls, floor, piping, supports and
12 entrance. At major locations, photographs shall include before, during, and after prints
13 and all prints shall be placed in binders in ascending date order to show the Work as it
14 progresses.
- 15 K. Descriptive Information:
- 16 1. Each photograph shall have a permanent title block on the back and shall contain the
17 typed information and arrangement as follows:
- 18 a. ORANGE COUNTY, FLORIDA
19 b. (ENTER PROJECT NAME)
20 c. BID No. (Enter Bid Number)
21 d. CONTRACTOR: (Name of Contractor)
22 e. DATE: (When photo was taken)
23 f. PHOTO NO.: (Consecutive Numbers)
24 g. PHOTO BY: (Firm Name of Photographer)
25 h. LOCATION: (Description of Location and View)
- 26 2. The Contractor shall provide the Professional with a written description of each
27 photograph. This description shall be included in the binders and a copy shall be
28 submitted with the CDs.

29 1.14 PROJECT RECORD DOCUMENTS

30 Project Record Documents shall be submitted in accordance with Section 01720 "Project
31 Record Documents" of these specifications.

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

33 **PART 3 - EXECUTION**

34 3.01 SUBMITTAL PROCEDURES

35 A. Article 9 of the General Conditions contains additional provisions regarding submittals.

- 1 B. Preliminary Shop Drawing Data: Within 20-days after the Award of the Contract or
2 before the Pre-Construction Meeting, the Contractor shall submit to the
3 County/Professional a complete listing of manufacturers for all items for which Shop
4 Drawings are to be submitted.
- 5 C. Shop Drawing Submittal Schedule: Within 30-days after the Notice to Proceed, the
6 Contractor shall submit to the County/Professional a complete schedule of Shop
7 Drawings submittals with the respective dates for submission, the beginning of
8 manufacture, testing and installation of materials, supplies and equipment, noting those
9 submittals critical to the progress schedule.
- 10 D. Submittal Log: An accurate updated log of submittals will be maintained by the
11 Contractor and subject to review by the County/Professional at each scheduled progress
12 meeting.
- 13 E. If the Contractor considers any correction indicated on the Drawings to constitute a
14 change to the Contract Drawings or specifications, the Contractor shall give written
15 notice thereof to the County/Professional. This does not constitute a change order until
16 accepted by the County.
- 17 F. Shop Drawing and submittal data shall be reviewed by the County/Professional for each
18 original submittal and first resubmittal; thereafter review time for subsequent resubmittals
19 shall be charged to the Contractor. The Contractor shall reimburse the County for
20 services rendered by the County/Professional at the rate multiplied by the County's
21 Professional multiplier based on the fee schedule provided to the County for this Project.
22 If a County engineer is performing any portion of the review, this fee is based upon the
23 hourly rate of the engineer times the County's multiplier for overhead, benefits, and
24 expenses. The Contractor agrees that the County shall deduct such charges from the
25 Contract Amount by a deductive Change Order.
- 26 G. Contractor Shop Drawing and Sample submittals shall include 5 copies in addition to any
27 other copies that the Contractor wants returned. The County will retain 5 copies of
28 approved submittals.
- 29 H. Identify Project, Project Number, date, dates of previous submittals, Contractor, Sub-
30 Contractors, suppliers with their addresses, pertinent Drawings by sheet and detail
31 number, and Specification Section number, as appropriate. Identify all deviations from
32 the Contract Documents. Provide space for Contractor and Professional review stamps.
- 33 I. Contractor's delivery of Shop Drawings for review shall follow a reasonable sequence, as
34 is necessary to support the dates on the Progress Schedule and avoid an overload of Shop
35 Drawings awaiting review at any one time. Coordinate submittal of related items.

- 1 J. Submit Shop Drawings per the schedule of Shop Drawing submittals, inserted in 1 loose-
2 leaf binder, with tabs and index to the County/Professional. All individual submittal
3 sheets inserted in said binder must be clearly marked and referenced to proper paragraph
4 and subparagraph of specifications. Cross out any items on sheets which constitute
5 information not pertaining to equipment specified. Clearly mark all components that are
6 provided as "optional" by manufacturer. Shop Drawings shall be approved by the
7 Contractor prior to submittal to the County/Professional. Shop Drawings will be
8 reviewed by the County/Professional. After County/Professional approval, reproduce
9 and distribute in accordance with requirements herein.
- 10 K. All submissions of Shop Drawings, brochures and catalog cuts shall be accompanied by a
11 transmittal letter listing the Drawings submitted by number and title.
- 12 L. When engineering calculations and/or professional certification of performance criteria of
13 materials, systems, and/or equipment are required, the County is entitled to rely upon the
14 accuracy and completeness of such calculations and certifications submitted by the
15 Contractor. Calculations, when required, shall be submitted in a neat, clear and in an
16 easy to follow format. Such calculations and/or certifications shall be signed and sealed
17 by a Professional Engineer registered in the State of Florida.
- 18 M. Distribute copies of reviewed submittals to concerned parties. Instruct recipients to
19 promptly report any inability to comply with provisions.
- 20 N. Prior to submission of Shop Drawings and samples, the Contractor shall stamp and sign
21 the submittals. Any submission which, upon examination by the County, shows evidence
22 of not having been thoroughly checked, or is not in compliance with the provisions of this
23 Section will be returned to the Contractor for completion before it will be considered for
24 review.
- 25 O. Notify the County of the need for making any changes in the arrangement of piping,
26 connections, wiring, manner of installation, etc., which may be required by the material
27 or equipment Contractor proposes to supply.
- 28 P. On resubmittals, direct specific attention in writing or on the revised Drawings or sample
29 to revisions other than the corrections required by County on previous submissions.
- 30 Q. All drawings, schematics, manufacturer's product data, certifications and other drawing
31 submittals required for a system specification shall be submitted at one time as a package
32 to facilitate interface checking.
- 33 R. The County will distribute Shop Drawings as follows for the indicated action taken:
34

SHOP DRAWING SUBMITTAL DISTRIBUTION

Representative Party	No Exception Taken or Make Correction Noted			Rejected or Revise & Resubmit		
	Submittal Transmittal	Shop Drawing	Review Comment Sheet	Submittal Transmittal	Shop Drawing	Review Comment Sheet
Engineer	2 Copies	File Copy	1 Copy	Original	File Copy	1 Copy
Contractor (see Note 1)	2 Copies	1 Copy Each Submittal	1 Copy	1 Copy	All Copies Except Engineers	1 Copy
County	1 Copy	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy
Inspector	2 Copies	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy
Project Record Data (see Note 2)	1 Copy	1 Copy Each Submittal	1 Copy	1 Copy	None	1 Copy

NOTES:

1. Contractor shall distribute additional copies to Subcontractors as required.
2. Stored by Contractor to be furnished to County upon closeout.

- 2 S. All Shop Drawings shall be accompanied with a transmittal letter providing the following
3 information:
- 4 1. Project Title and Contract Number
 - 5 2. Date
 - 6 3. Contractor's name and address
 - 7 4. The number of each Shop Drawing, project data, and sample required
 - 8 5. Notification of Deviations from Contract Documents
 - 9 6. Submittal Log Number conforming to specification section numbers
 - 10 a. Submit each specification section separately.
 - 11 b. Identify each Shop Drawing item required under respective specification section.
 - 12 c. Identify resubmittal using specification section followed by A (first resubmittal),
13 B (second resubmittal)...etc.

14 3.02 CONTRACTOR'S REVIEW

- 15 A. Contractor's Responsibility for Coordination: Where the dimension, size, shape, location,
16 capacity or other characteristic affects another item, and where the Contractor selects,
17 fabricates or installs related or adjacent products to be used, the Contractor shall be
18 responsible for coordination of related items. The Contractor shall insure that a proper
19 exchange of information takes place prior to or during preparation of each submittal and
20 that submittals reflect such coordination. The notation "verify" or "coordinate" on the
21 Drawings indicates the necessity for Contractor coordination in the particular instances
22 used.

- 1 B. Contractor's Checking: When checking submittals from Subcontractors and suppliers, the
2 Contractor shall mark all sets, indicating his corrections and comments in blue or green.
3 Copies marked in red may be returned for revision.
- 4 C. The Contractor is responsible to deliver and pick-up all submittals in a timely manner at
5 the County/Professional's designated office. The Contractor is responsible for all related
6 costs and expenses for the transmittal of such submittals.

7 3.03 COUNTY'S / PROFESSIONAL'S REVIEW

- 8 A. Corrections or comments made on Shop Drawings during review do not relieve the
9 Contractor from compliance with the requirements of Drawings and Specifications. This
10 check is only for review of general conformance with the design concept of this Project
11 and general compliance with information given in Contract Documents. Any
12 substitutions or changes shall be properly noted.
- 13 B. No action will be taken on "rough-in" Shop Drawings for plumbing and electrical
14 connections when the items of equipment are not included in the same submittal.
- 15 C. Review Time:
 - 16 1. On a normal basis, each submittal will be returned to the Contractor within 15
17 working days of the date it is received. Some submittals may require additional time.
 - 18 2. If, for any reason, the above schedule cannot be met, the Contractor will be so
19 informed within a reasonable period and the Schedule of Submittals revised. If the
20 specific submittal affects the critical path, the Contractor shall immediately notify the
21 County/Professional in writing. In the event of separate submittals of individual
22 components of a system, these submittals may be held until all components of the
23 system are submitted, and the Contractor will be so notified.

25 END OF SECTION

- 1 C. Transmittal Mechanics
2 1. Follow the transmittal mechanics prescribed for Shop Drawings in Specification
3 Section 01300 "Submittals."
4 a. Product substitution will include in the transmittal letter, either directly or as a
5 clearly marked attachment, the items listed in Paragraph D below.
- 6 D. Transmittal Contents
7 1. Product identification:
8 a. Manufacturer's name
9 b. Telephone number and representative contact name
10 c. Specification Section or Drawing reference of originally specified product,
11 including discrete name or tag number assigned to original product in the Contract
12 Documents.
13 2. Manufacturer's literature clearly marked to show compliance of proposed product
14 with Contract Documents.
15 3. Itemized comparison of original and proposed product addressing product
16 characteristics including but not necessarily limited to:
17 a. Size
18 b. Composition or materials of construction
19 c. Weight
20 d. Electrical or mechanical requirements
21 4. Product experience
22 a. Location of past projects utilizing product.
23 b. Name and telephone number of persons associated with referenced projects
24 knowledgeable concerning proposed product.
25 c. Available field data and reports associated with proposed product.
26 5. Data relating to changes in construction schedule.
27 6. Data relating to changes in cost.
28 7. Samples
29 a. At request of County/Professional.
30 b. Full size if requested by County/Professional.
31 c. Held until substantial completion.
32 d. County/Professional is not responsible for loss or damage to samples.

33 1.05 APPROVAL OR REJECTION

- 34 A. Written approval or rejection of substitution to be given by the Engineer.
35 B. Engineer reserves the right to require proposed product to comply with color and pattern
36 of specified product if necessary to secure design intent.
37 C. In the event the substitution is approved, the resulting cost and/or time reduction will be
38 documented by Change Order in accordance with the General Conditions.
39 D. Substitution will be rejected if:
40 1. Submittal is not through the Contractor with his stamp of approval.
41 2. Request is not made in accordance with this Specification Section.

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- 1 4. CPM Schedule: The Progress Schedule based on the Critical Path Method (CPM) of
2 scheduling. The term Critical Path means any continuous sequence of Activities in
3 the Progress Schedule controlling, because of their sum duration, the Early Date of a
4 pertinent, specified Contract Time.
- 5 5. Early/Late Dates: Early/late times of performance, based on CPM calculations, for an
6 Activity in the Progress Schedule. Early Dates will be based on proceeding with all
7 or part of the Work on the date when the corresponding Contract Time commences to
8 run. Late Dates will be based on completing all or part of the Work on the
9 corresponding Contract Time, even if the Contractor plans early completion.
- 10 6. Milestones: Key, pre-determined points of progress in the completion of a facility,
11 denoting interim targets in support of the Contract Times. Milestones may pinpoint
12 targets for key excavation and substructure events, significant deliveries, critical path
13 transition from superstructure to piping and electrical rough in and building
14 enclosure. Also, hook-up of mechanical and electrical equipment, availability of
15 power for testing, equipment shakedown, training of County personnel, start up,
16 Substantial Completion and other events of like import.
- 17 7. Official Schedule: The Initial or most recent Revision Submittal accepted by the
18 County or returned as no resubmittal required and the basis for Payment Submittals
19 until another Revision Submittal is submitted and accepted. The accepted Initial
20 Submittal is also the As-Planned Schedule.
- 21 8. Payment Submittal: A monthly Progress Schedule update reflecting progress and
22 minor adjustments on the Activities, sequencing and restraints for Work remaining.
- 23 9. Total Float: Days by which an activity may slip from its Early Dates without
24 necessarily extending a pertinent Contract Time. Total Float at least equals Contract
25 Float. Total Float may also be calculated and reported in working Days. When an
26 activity is delayed beyond Early Dates by its Total Float it becomes a Critical Path
27 activity and if delayed further will impact a Contract Time.

28 1.03 QUALITY ASSURANCE

- 29 A. The Contractor may self-perform the Work covered by this Section or employ a
30 Subcontractor, subject to the County's consent. Employment of a scheduling
31 Subcontractor shall not in any way alter or reduce the Contractor's obligations under the
32 Contract Documents.
- 33 B. The Contractor will obtain a written interpretation from the County, if the Contractor
34 believes that the selection of activities, logic ties and/or restraints requires a written
35 interpretation of the Contract Documents. With each submission, the Contractor will
36 point out by specific, written notation, any Progress Schedule feature that may reflect
37 variations from any requirements of the Contract Documents.
- 38 C. It is the Contractor's responsibility to obtain information directly from each Subcontractor
39 and Supplier when scoping their respective Activities, Values, logic ties and restraints.

1 D. Neither Acceptance nor Review of any Progress Schedule will relieve the Contractor
2 from the obligation to comply with the Contract Times and any sequence of Work
3 indicated in or required by the Contract Documents and to complete, within the Contract
4 Times, any Work omitted from that Progress Schedule.

5 E. Neither Acceptance nor Review of any Progress Schedule will imply approval of any
6 interpretation of or variation from the Contract Documents, unless expressly approved by
7 the County through a written interpretation or by a separate, written notation on the
8 returned Progress Schedule Submittal.

9 1.04 MILESTONES AND SCHEDULE RECOVERY

10 A. The County will select Milestones and Milestone Dates on the basis of the As-Planned
11 Schedule. As the Official Schedule is revised, Milestone Dates will be revised
12 accordingly. Milestone Dates will serve as target dates.

13 B. Whenever any Activity slips by 14 or more Days from the Late Date for an activity in the
14 Official Schedule, Milestone Dates selected by the County, or a pertinent Contract Time,
15 the Contractor will deliver a Revision Submittal documenting the Contractor's schedule
16 recovery plan and/or a properly supported request for an extension in the Contract Time.
17 The narrative will identify the Delay and actions taken by the Contractor to recover
18 schedule, whether by adding labor, Subcontractors or construction equipment, activity re-
19 sequencing, expediting of submittals and/or deliveries, overtime or shift Work, and so
20 forth. Activity shortening and overlapping shall be explained as to their basis (and be
21 supported by increases in resources).

22 C. Upon evaluation of that Revision Submittal, if the County determines there is sufficient
23 cause, the County may withhold liquidated damages or provide a notice of intent to do so,
24 if schedule is indeed not recovered, and/or may give a notice of default.

25 1.05 PROGRESS SCHEDULE SOFTWARE

26 A. The scheduling software employed by the Contractor to process the Progress Schedule
27 will be the current version of Primavera P6.0®, or Primavera® Contractor 5.0 CPM
28 scheduling software.

29 B. If the Contractor intends to use companion schedule reporting, analysis or graphics
30 software tools, the Contractor will furnish to the County descriptive materials and
31 samples describing such software tools.

32 1.06 NON-PERFORMANCE

33 A. The County may refuse to recommend all or any part of any payment, if the Contractor
34 fails, refuses or neglects to provide the required Progress Schedule information on a
35 timely basis. Partial payments without a properly updated Progress Schedule shall be
36 returned to the Contractor as non-conforming.

- 1 B. If justified under the circumstances, the County also may prepare alternate Progress
2 Schedules, as appropriate, and deduct from the Contract Amount all related costs by
3 Change Order and/or take other action commensurate with the breach.

4 1.07 REPORTS, SCHEDULES AND PLOTS

- 5 A. Schedule Reports will include Activity (ID) code and description, duration, calendar,
6 Early Dates, Late Dates and Total Float. Separate Schedule Reports will tabulate, for
7 each Activity, all preceding and succeeding logic types and lead times, whether CPM
8 Plots displaying logic ties are appended or not.

- 9 B. CPM Schedule Plots will be plotted on a suitable time scale and identify the Contract
10 Times, Critical Paths, phases and work areas on 24-inch x 36-inch or smaller sheets.
11 Activities will be shown on the Early Dates with Total Floats noted by Late Date flags.
12 For Payment and Revision Submittals plot a target comparison based on the current
13 Official Schedule.

- 14 C. The Activity Value report will tabulate Activity code and description and Activity Value,
15 percent complete and earned value as calculated by the scheduling software. Cash flow
16 plots shall be provided showing the monthly and cumulative actual and planned earned
17 values with curves shown for Early and Late Dates in the schedules. For Payment and
18 Revision Schedule submittals, the cash flow curves shall also plot the most current
19 Official Schedule planned earnings curves.

- 20 D. Each submittal shall include listings of all added and deleted activities, logic, constraints,
21 Activity Value changes and update information vs. the previous Progress Schedule
22 submittal. This list may be manually prepared or generated by accessory software that
23 will generate such listings.

24 1.08 NARRATIVE REQUIREMENTS

- 25 A. The Initial Submittal narrative will describe the Contractor's approach to prosecution of
26 the Work and the basis for determination of activity durations, sequence and logic,
27 including the Contractor's management of the site, e.g., lay down, staging, parking, etc.;
28 Contractor's phasing of the Work; use of crewing and construction equipment;
29 identification of non-work County/Professional's, shifts, weekend Work and multiple
30 calendars applied to activities and an explanation of the basis for restraint dates.

- 31 B. Revision and Payment Submittal narratives will explain any changes to the approach or
32 planning referred to in Paragraph A above on account of any change, delay, schedule
33 recovery, substitution and/or Contractor-initiated revision occurring since the previous
34 submittal.

- 35 C. Each narrative will list the Critical Path Activities and compare Early and Late Dates
36 against Contract Times and Milestone Dates. Narratives shall also recap progress and
37 Days gained or lost vs. the current Official Schedule, and identify delays, their extent and
38 causes.

1 D. The Initial Submittal narrative will describe all delays occurring since Contract Award
2 and all pending and anticipated "or equal" and substitution proposals. Payment and
3 Revision Submittal narratives will describe any new delays and shall certify that the
4 Contractor has not been delayed, as of the cut off date, by any acts or omissions of the
5 County, except as otherwise specifically stated.

6 1.09 ACTIVITY REQUIREMENTS

7 A. Separate activities will identify permits, design when included in the Work, construction,
8 Submittal preparation and review (and resubmission and re-review), deliveries (site or
9 storage), testing, start-up, commissioning and Punch List.

10 B. Activities will be detailed to the extent required to show the transition of trade Work.
11 Activities will delineate the progression of the Work.

12 C. Activities will not combine separate or non-concurrent items of Unit Price or lump sum
13 Work.

14 D. Activity durations will equal the Work Days required to sufficiently complete the Work
15 designated by the Activity, (i.e., when finish-to-start successors could start, even if the
16 Activity is not quite 100% complete). Installation Activities will last from 10 to 40
17 workdays. Submittal review activity durations shall conform to specified timeframes.

18 E. Activities will be assigned consistent descriptions and identification codes. Sort codes
19 will group Activities by meaningful schemes.

20 F. Activities will be assigned Activity Values as appropriate and needed to reasonably
21 allocate the Contract Amount to the time periods that they will be earned and eligible for
22 payment based on the Progress Schedule and Schedule of Values. Separate pay activities
23 may be used to simplify cost loading of the Progress Schedule. When used, pay activities
24 shall be loaded with the cost of Work that is included, at no cost, in related (generally,
25 concurrent) CPM activities. Pay activities shall not control the rate of progress; however,
26 their start and finish dates shall be consistent with those of their related CPM activities to
27 ensure accurate Early Date and Late Date cash-flow plots.

28 1.10 FLOAT TOLERANCES AND FLOAT OWNERSHIP

29 A. Any Progress Schedule with Early Dates after a Contract Time will yield negative Total
30 and Contract Floats, whether shown/calculated or not. Any Revision Submittal with less
31 than negative 20-days of Float will be returned as "Revise and Resubmit," unless a time
32 extension is requested or the County assesses liquidated damages or gives notice of intent
33 to do so, in the event schedule is not recovered.

34 B. Float calculated from the definitions given in this Section supersede any conflicting Float
35 values in any early completion Progress Schedule.

1 C. Neither the County nor the Contractor own the Float time, the Project owns the Float
2 time. Neither the County nor the Contractor use of positive Total Float will impact a
3 Contract Completion Date or justify an extension of Contract Time.

4 1.11 SUBMITTALS

5 A. Each Progress Schedule Submittal will consist of a narrative, 5 copies of the required
6 reports and plots and an optical ROM data disk with the Contractor's corresponding
7 schedule and schedule layout files in Primavera ".XER" format.

8 B. The County will review Progress Schedule Submittals and return a review copy within
9 14-days after receipt and the Contractor shall, if required, resubmit within 7-days after
10 return of the review copy.

11 C. Requirements for the Initial Submittal:

12 1. Within 20-days after receipt of Notice to Proceed and prior to commencing Work on
13 the Project, prepare and submit to the County the Initial Submittal of the Progress
14 Schedule for the Work. The Initial Submittal will show the Work as awarded,
15 without delays, Change Orders or substitutions.

16 a. Activity Values will prorate Schedule of Values costs and/or pay items through to
17 Activities. Provide a cross-reference listing with two parts; a part that will list
18 each activity with the respective amounts allocated from each Schedule of Values
19 and Unit Price Item making up the total value of each activity and a second part
20 that will list the Schedule of Values and Unit Price Items with the respective
21 amounts allocated from each activity that make up the total value of each item.

22 2. After the As-Planned Schedule is established, the County will select Milestones and
23 record the Milestone Early and Late Dates. As the Official Schedule evolves,
24 Milestone Dates will be revised accordingly.

25 3. If the County refuses to endorse the Initial Submittal (or a resubmission) as
26 "Resubmittal Not Required," the As-Planned Schedule will not be established. In that
27 event, the Contractor will continue to submit Payment and Revision Submittals
28 reflecting progress and the Contractor's approach to remaining Work. The County
29 will rely on the available Payment and Revision Submittals, subject to whatever
30 adjustments it determines appropriate.

31 D. Requirements for Payment Submittals:

32 1. Payment Submittals with progress up to the closing date and updated Early Dates and
33 Late Dates for progress and remaining Activities will be due with each Progress
34 Payment. As-built data will consist of actual dates, percent complete, earned
35 payment, changes, Delays and other significant events occurring before the closing
36 date.

37 2. Activity percent complete and earned value should indicate a level of completion that
38 corresponds to the Application for Progress Payment for the same period. The earned
39 value should be calculated by the scheduling software as Activity Value times percent
40 complete. Explanation should be provided whenever the cumulative earned value of
41 activities in a Payment Submittal is not within 10% of the value of Work completed
42 as represented in the corresponding Application for Progress for Payment.

- 1 3. At the Contractor's option, a Payment Submittal may overlay minor adjustments on
2 activities and sequencing for Work remaining. This excludes Activity re-scoping to
3 reflect Delays, changes, schedule recovery or substitutions.

4 E. Requirements for Revision Submittals:

- 5 1. Revision Submittals will be submitted when necessary because of major changes or
6 delays affecting activities, sequencing or restraints for Work remaining and/or to put
7 forth a schedule recovery plan. Revision Submittals may also be required because of
8 Contractor-initiated re-planning, or when Contractor plans to perform Work ahead or
9 out-of-sequence that will require additional testing or inspection personnel, or when
10 requested by the County when Work is performed out-of-sequence from the current
11 Official Schedule such that the number of Days gained or lost can not be determined
12 or the scheduled dates of completion of the Work in a Payment Submittal are not
13 viewed as reliable.
- 14 2. If requesting a time extension, the Revision Submittal should show the impact of the
15 delay after incorporating reasonable mitigation to minimize the impact and illustrate
16 how the number of Days requested time extension was determined. The delay should
17 be determined as the change in the forecast Contract Completion Date(s) resulting
18 solely from delays that entitle the Contractor to a time extension as provided in the
19 General Conditions. Any and all Contractor slippage and delay occurring prior to and
20 concurrent with the delay potentially entitling the Contractor to a time extension shall
21 be incorporated in the Revision and explained such that the concurrent and non-
22 concurrent periods of delay are indicated. If the Contractor does not follow the
23 procedures contained in this Section or, if the Contractor's analysis is not verifiable
24 by an independent, objective evaluation by the County using the electronic files and
25 data furnished by the Contractor, any such extension in Contract Time will not be
26 granted.

27 F. Retrospective Delay Analysis.

- 28 1. If the County/Professional refuses to endorse any Revision Submittal as "Resubmittal
29 Not Required," the Contractor and County will use the latest Official Schedule when
30 evaluating the effect of Delays on Contract Time and/or Contract Price. The
31 procedure to be used will consist of progressively updating the latest Official
32 Schedule at key closing dates corresponding to starting and finishing dates of the
33 delays and/or dates the delays became critical or dates the Critical Path may have
34 changed for other reasons. For each Progress Schedule iteration, slippage between
35 actual Milestone Dates and Initial Milestone Dates will be correlated to Delays
36 occurring solely in that iteration.
- 37 2. For each iteration, revisions in Activities, logic ties and restraints affecting Work after
38 the closing date will be included in that Progress Schedule only if they meet any of
39 the following conditions. First, they are Progress Schedule revisions that the County
40 consented to contemporaneously (i.e., before the closing date) in writing. Second,
41 they reflect comments or objections raised by or on behalf of the County and that
42 were actually confirmed by the as-built progress. Lastly, they represent Contractor's
43 schedule recovery plans or other Progress Schedule revisions that were actually
44 confirmed by the as-built progress.

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

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

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END OF SECTION

SECTION 01370
SCHEDULE OF VALUES

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PART 1 - GENERAL

1.01 DEFINITION

A. Schedule of Values: Schedule that divides the Contract Amount into pay items, such that the sum of all pay items equals the Contract Amount for the Work, or for any portion of the Work having a separate specified Contract Amount.

1.02 REQUIREMENT

A. The Schedule of Values established as provided in the General Conditions will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to the County. Progress payments on account of Unit Price Work will be based on the number of units completed.

B. No payment will be made for Work performed on a lump sum contract or a lump sum item until the appropriate Schedule of Values is approved by the County.

C. The equitable value of Work deleted from a lump sum contract or lump sum item shall be determined from the approved Schedule of Values.

1.03 SUBMITTALS

A. Submit 3 copies of a Preliminary Schedule of Values within 15-days after the recommended award of the Contract.

B. Submit 3 copies of a proposed final Schedule of Values within 20-days after receipt of Notice to Proceed as per the General Conditions.

C. Submit the Schedule of Values, typed, on EJCDC 1910-8-E form or Orange County forms or spreadsheets provided by County. The Contractor's standard form or electronic media printout will be considered for acceptability by the County.

D. List installed value of each major item of Work and each subcontracted item of Work as a separate line item to serve as a basis for computing values for Progress Payments. Round off values to nearest dollar.

E. Coordinate listings with the Progress Schedule.

F. For items on which payments will be requested for stored materials or equipment, list sub-values for cost of stored products with taxes paid.

G. Submit a sub-schedule for each separate stage of Work specified in Section 01010 "Summary of Work."

- 1 H. The sum of values listed shall equal the total Contract Amount for the Work or the
2 Contract Amount for a part of the Work with a separate Contract Amount provided for by
3 the Contract Documents.
- 4 I. When the County requires substantiating information, submit data justifying line item
5 amounts in question.

6 1.04 UNIT PRICE CONTRACTS

- 7 A. For unit price contracts, the bid item prices on the Project Bid Schedule shall be used as
8 the basis for the schedule of values. The Contractor shall resubmit the bid item prices in
9 the format described herein, and may, at its option, or if requested by the County, divide
10 the items in the Project Bid Schedule into sub-items to provide a more detailed basis of
11 payment.

12 1.05 LUMP SUM CONTRACTS

- 13 A. For lump sum contracts, if the Work involves separate facilities, e.g. multiple pump
14 stations, the cost of the Work shall be separated by each facility and into schedule of
15 value items. Break principal subcontract amounts down into these items; The lump sum
16 cost for each facility shall be submitted individually and split into the schedule of values
17 listed in items 1 through 14.
- 18 1. Demolition of existing pump station
 - 19 2. Bypass pumping
 - 20 3. Wetwell structure, liner, top slab, hatch covers and appurtenances
 - 21 4. Valve vault structure, hatch covers and appurtenances, drain piping and
22 appurtenances
 - 23 5. Wetwell (mechanical): 316 stainless steel piping and appurtenances, pumps and base
24 plates
 - 25 6. Valve vault (mechanical): piping, valves, and appurtenances
 - 26 7. Yard piping, fittings, valves, and appurtenances (outside of structures)
 - 27 8. Site work and access drive
 - 28 9. Chain link fence and gates
 - 29 10. Masonry walls and gates
 - 30 11. Odor control equipment, piping, monitoring equipment, etc
 - 31 12. Generator, fuel storage tank and related piping
 - 32 13. Electrical control panel, wiring, and connections
 - 33 14. Start-up and testing

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

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

36 END OF SECTION

- 1 B. Each DVD shall contain the following information and arrangement at the beginning as a
2 title screen:
3 Orange County, Florida
4 PROJECT NAME
5 PROJECT NUMBER
6 CONTRACTOR: (Name of Contractor)
7 DATE: (When photo was taken)
8 VIDEO BY: (Firm Name of Videographer)
9 LOCATION: (Description of Location(s) and View(s))
- 10 C. Each DVD recording section shall begin with an audio description of the County's name,
11 Contract name and number, Contractor's name, date and location information such as
12 street name, direction of travel, viewing side, etc.
- 13 D. Information appearing on the video recording must be continuous and run simultaneously
14 by computer generated transparent digital information. No editing or overlaying of
15 information at a later date will be acceptable.
- 16 E. Digital information to appear in the upper left corner shall be as follows:
17 1. Name of Contractor
18 2. Day, date and time
19 3. Name of Project & Specification Number
- 20 F. Time must be accurate and continuously displayed on the video record
- 21 G. Written documentation must coincide with the information on the DVD so as to make
22 easy retrieval of locations at a later date.
- 23 H. The video system shall have the capability to transfer individual frames of video
24 electronically into hard copy prints or photographic negatives.
- 25 I. Audio shall be recorded at the same time as the video recording and shall have the same
26 information as on the viewing screen. Special commentary shall be given for unusual
27 conditions of buildings, sidewalks and curbing, foundations, trees and shrubbery,
28 structures, equipment, pavement, etc.
- 29 J. All DVDs and boxes shall bear labels with the following information:
30 1. DVD Number
31 2. County's Name
32 3. Date of Recording
33 4. Project Name and Number
34 5. Location and Standing Limit of Video

35 2.02 CONSTRUCTION PHOTOGRAPHS

- 36 A. The Contractor shall employ a competent photographer to take construction record
37 photographs periodically during the course of the Work.

- 1 B. Prints: Date imprinted 8-inch x 10-inch high resolution glossy single weight color print
- 2 paper; 5 sets, bound in 3-ring binders to be provided to the County with each respective
- 3 Application for Payment and distributed by the County as follows:
- 4 1. County (2 sets)
- 5 2. Engineer (1 set)
- 6 3. Contractor (1 set)
- 7 4. Project Record Data (1 set stored by Contractor to be furnished to County upon
- 8 Closeout)

9 **PART 3 - EXECUTION**

10 3.01 VIDEO VIEWS REQUIRED

- 11 A. Complete coverage shall include all surface features within 100-feet of the Work area to
- 12 be used by the Contractor and shall be supported by appropriate audio description made
- 13 simultaneously with video coverage. Such coverage shall include, but not be limited to,
- 14 all existing driveways, sidewalks, curbs, ditches, roadways, landscaping, trees, culverts,
- 15 headwalls, and retaining walls, equipment, structures, pavements, manholes, vaults,
- 16 handrails, etc. located within the work zone. Video coverage shall extend to the
- 17 maximum height of all structures within this zone.

- 18 B. The video recorder shall take special efforts to point out and provide audio commentary
- 19 on cracking, breakage, damage, and other defects in existing features.

- 20 C. All video recording shall be done during times of good visibility. No video recording
- 21 shall be done during periods of visible precipitation, or when more than 10% of the
- 22 ground area is covered with standing water, unless otherwise authorized by County.

- 23 D. Prior to commencement of audio-video recording, the Contractor shall notify the County
- 24 in writing within 48-hours of the audio-video recording. The County may provide a
- 25 designated representative to accompany and observe all video recording operations.
- 26 Audio-video recording completed without a County Representative present will be
- 27 unacceptable unless specifically authorized by the County.

28 3.02 AUDIO-VIDEO REQUIREMENTS

- 29 A. Major Locations:
- 30 1. The Contractor shall provide color digital video of each major facility and structures
- 31 and facilities adjacent to the Construction before construction starts.
- 32 2. All videos shall be recorded with character generator operating with date, time, and
- 33 location on screen. During video recording, the Contractor shall narrate video
- 34 explaining what is being shown. All master videos shall be delivered to the County.

- 1 3. The audio and video portions of the recording shall maintain viewer orientation. To
2 this end, overall establishing views of all visible house and business addresses shall
3 be used. In areas where the proposed construction location will not be readily
4 apparent to the video recording viewer, highly visible yellow flags shall be placed, by
5 the Contractor, in such a fashion as to clearly indicate the proposed centerline of
6 Construction. When conventional wheeled vehicles are used as conveyances for the
7 recording system, the vertical distance between the camera lens and the ground shall
8 not exceed 10-feet. The camera shall be firmly mounted such that transport of the
9 camera during the recording process will not cause an unsteady picture.
- 10 4. All video recording shall be done during time of good visibility. No video recording
11 shall be done during precipitation, mist or fog. The recording shall only be done
12 when sufficient sunlight is present to properly illuminate the subjects of recording and
13 to produce bright, sharp video recordings of those subjects.
- 14 5. The average rate of travel during a particular segment of coverage shall be directly
15 proportional to the number, size and value of the surface features within that
16 construction area's zone of influence. The rate of speed in the general direction of
17 travel of the vehicle used during taping shall not exceed 44-feet per minute.

18 3.03 PHOTOGRAPHS

- 19 A. A minimum of 3 views (top, upstream, and downstream) each shall generally be taken
20 prior to backfilling pipelines or structures. Photographs shall be provided for:
 - 21 1. Utility conflicts/relocations
 - 22 2. Manholes
 - 23 3. Pump stations
 - 24 4. Boring and jacking
 - 25 5. Directional drilling pipe entrance and exit
 - 26 6. Valve installation
 - 27 7. Air release valve installation
 - 28 8. Fire hydrant assembly
- 29 B. Photo Identification
 - 30 1. Name of Project
 - 31 2. Name of Structure
 - 32 3. Orientation of View
 - 33 4. Date & Time of Exposure
 - 34 5. Film numbered identification of exposure
 - 35

36 END OF SECTION

1 D. The Contractor is responsible for the Quality of his own work and shall designate a
2 qualified individual, to be approved by the County, who will ensure that all work is
3 performed in strict accordance with the Contract Documents. This quality representative
4 shall inspect the work for the Contractor and provide to the County and the Contractor a
5 report outlining all work accomplished, all inspections, and all testing performed for all
6 days when work is performed. The objective of this report is to provide "Objective
7 Evidence of Compliance" by the Contractor with the requirements of the Contract.

8 1.03 TIME OF INSPECTION AND TESTS

9 A. Samples and testing required under these Specifications shall be furnished and prepared
10 in ample time for the completion of the necessary tests and analyses before said articles
11 or materials are to be used. Except as otherwise provided in the Contract Documents,
12 performance of the required tests will be by the Contractor and all costs therefore will be
13 borne by the Contractor at no cost to the County. Whenever the Contractor is ready to
14 backfill, bury, cast in concrete, hide, or otherwise cover any Work under this Contract,
15 the County shall be notified not less than 24-hours in advance to request inspection
16 before beginning any such Work of covering. Failure of the Contractor to notify the
17 County at least 24-hours in advance of any such inspections shall be reasonable cause for
18 the County to order a sufficient delay in the Contractor's schedule to allow time for such
19 inspection, any remedial, or corrective work required, and all costs of such delays,
20 including its impact on other portions of the Work, shall be borne by the Contractor.

21 1.04 SAMPLING AND TESTING

22 A. When not otherwise specified, all sampling and testing shall be in accordance with the
23 methods prescribed in the current standards of the ASTM, as applicable to the class and
24 nature of the article or materials considered. However, the County reserves the right to
25 use any generally accepted system of inspection which, in the opinion of the County, will
26 ensure the County that the quality of the workmanship is in full accord with the Contract
27 Documents.

28 B. Any waiver of any specific testing or other quality assurance measures, whether or not
29 such waiver is accompanied by a guarantee of substantial performance as a relief from
30 the specified testing or other quality assurance requirements as originally specified, and
31 whether or not such guarantee is accompanied by a performance bond to assure execution
32 of any necessary corrective or remedial work, shall not be construed as a waiver of any
33 technical or qualitative requirements of the Contract Documents.

34 C. Notwithstanding the existence of such waiver, the County shall reserve the right to make
35 independent investigations and tests as specified in the following paragraph and, upon
36 failure of any portion of the Work to meet any of the qualitative requirements of the
37 Contract Documents, shall be reasonable cause for the County to require the removal or
38 correction and reconstruction of any such Work.

1 D. In addition to any other inspection or quality assurance provisions that may be specified,
2 the County shall have the right to independently select, test, and analyze, at the expense
3 of the County, additional test specimens of any or all of the materials to be used. Results
4 of such tests and analyses shall be considered along with the tests or analyses made by
5 the Contractor to determine compliance with the applicable specifications for the
6 materials so tested or analyzed provided that wherever any portion of the Work is
7 discovered, as a result of such independent testing or investigation by the County which
8 fails to meet the requirements of the Contract Documents, all costs of such independent
9 inspection and investigation and all costs of removal, correction, reconstruction, or repair
10 of any such Work shall be borne by the Contractor.

11 1.05 RIGHT OF REJECTION

12 A. The County shall have the right at all times and places to reject any articles or materials
13 to be furnished hereunder which, in any respect, fail to meet the requirements of the
14 Contract Documents, regardless of whether the defects in such articles or materials are
15 detected at the point of manufacture or after completion of the Work at the site. If the
16 County or inspector, through an oversight or otherwise, has accepted materials or Work
17 which is defective or which is contrary to the Contract Documents, such material, no
18 matter in what stage or condition of manufacture, delivery, or erection, may be rejected
19 by County.

20 B. Contractor shall promptly remove rejected articles or materials from the site of the Work
21 after notification or rejection.

22 C. All costs of removal and replacement of rejected articles or materials, as specified herein,
23 shall be borne by the Contractor.

24 D. If the Contractor fails to remove or replace defective work after notification to do so, the
25 County may have the work removed and replaced by others and deduct all costs from the
26 Contractor's pay requests.

27 1.06 TESTING LABS

28 A. All geotechnical testing laboratory services for field testing will be paid by the County.
29 The lab(s) shall function as independent lab(s) and report independently to the County
30 and the Contractor. The test lab(s) may not approve or allow any deviation from the
31 Contract Documents.

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

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

34 END OF SECTION

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1 **SECTION 01560**

2 **EROSION AND SEDIMENTATION CONTROL**

3 **PART 1 - GENERAL**

4 1.01 WORK INCLUDED

5 A. The Work specified in this Section consists of designing, providing, maintaining and
6 removing temporary erosion and sedimentation controls as necessary to protect the Work
7 and prevent sedimentation from the Contractor's activities from entering water bodies or
8 enter other parts of the County's or other property owners sites outside the Construction
9 limits.

10 B. Temporary erosion controls include, but are not limited to; grassing, mulching, netting,
11 watering and reseeded on-site surfaces and soil and borrow area surfaces, and providing
12 interceptor ditches at end of berms and at those locations which will ensure that erosion
13 during Construction will be either eliminated or maintained within acceptable limits as
14 established by the regulatory agencies having jurisdiction.

15 C. Temporary sedimentation controls include, but are not limited to; silt dams, traps,
16 barriers, and appurtenances at the foot of sloped surfaces which will ensure that
17 sedimentation pollution will be either eliminated or maintained within acceptable limits
18 as established by the regulatory agencies having jurisdiction.

19 1.02 REQUIREMENTS

20 A. The Contractor is responsible for providing effective temporary erosion and sediment
21 control measures during Construction or until final controls become effective.

22 B. The Contractor shall be responsible for filing Notice of Intent for Construction Activities
23 with regulatory agencies (SJRWMD, SFWMD, and FDEP) as required by law, if
24 thresholds are expected to be exceeded.

25 C. The areas of unstabilized soil cover shall be minimized at all times to limit erosion and
26 sedimentation.

27 1.03 SUBMITTALS:

28 A. The Contractor shall prepare and submit an Erosion and Sedimentation Control Plan
29 (Stormwater Pollution Prevention Plan) for County review and approval. The Plan shall
30 be in effect throughout the Construction duration.

1 **PART 2 - PRODUCTS**

2 2.01 EROSION CONTROL

3 A. Seed: Scarified Argentine Bahia.

4 B. Sod: Bermuda grass, Argentine Bahia grass, Pensacola Bahia grass or St. Augustine.
5 Grassing and Sodding Materials: As specified in Section 981 FDOT Specification for
6 Road & Bridge Construction.

7 C. Netting: Polypropylene mesh netting 5/8-inch x 3/4-inch (16 x 19mm) mesh with
8 interwoven curlex fibers as manufactured by American Excelsior Company or equal.
9 Netting: Fabricated of material in conformance with Section 985 FDOT Specification for
10 Road & Bridge Construction.

11 2.02 SEDIMENTATION CONTROL

12 A. Bales: Clean, synthetic hay type. Minimum dimensions of 14-inch by 18-inch by 36-
13 inches at the time of placement.

14 B. Netting: Fabricated of material in conformance with Section 985 FDOT Specification for
15 Road & Bridge Construction.

16 C. Sediment Control Fencing (Silt Fencing): As manufactured by American Excelsior
17 Company or equal.

18 D. Filter stone: Crushed stone conforming to Florida Department of Transportation
19 Specifications.

20 E. Concrete block: Hollow, non-load bearing type.

21 F. Concrete: Exterior grade not less than 1-inch thick.

22 G. Turbidity Barriers: Floating or staked as required.

23 **PART 3 - EXECUTION**

24 3.01 TEMPORARY EROSION CONTROL

25 A. See Section 02578 "Solid Sodding."

26 3.02 SEDIMENTATION CONTROL

27 A. Install and maintain silt fences and dams, traps, barriers, and appurtenances as shown on
28 the approved descriptions and working Drawings. Replace deteriorated hay bales and
29 dislodged filter stone. Repair portions of any devices damaged at no additional expense
30 to the County.

- 1 B. Install all sediment control devices in a timely manner to ensure the control of sediment.
2 At sites where exposure to sensitive areas is likely, complete installation of all sediment
3 control devices before starting earthwork.
- 4 C. Use approved temporary erosion control features to correct conditions that develop
5 during Construction that were not foreseen when the Erosion and Sedimentation Control
6 Plan was first approved.

7 3.03 PERFORMANCE

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

23 3.04 MAINTENANCE OF EROSION AND CONTROL FEATURES

- 24 A. Provide routine maintenance of permanent and temporary erosion control features, at no
25 expense to the County, until the Project is complete and accepted.
26

27 END OF SECTION
28

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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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1 **SECTION 01580**

2 **PROJECT IDENTIFICATION AND SIGNS**

3 **PART 1 - GENERAL**

4 1.01 REQUIREMENTS INCLUDED

- 5 A. The Contractor shall furnish, install, and maintain all sign materials including sign posts,
6 weighted stands, brackets, any required mounting hardware, and miscellaneous materials
7 required for temporary signs for the purpose of:
8 1. Project Identification.
9 2. Informational signs to direct traffic
10 3. On-site safety signs as appropriate for the Work
- 11 B. Remove temporary signs on completion of Construction prior to obtaining Certificate of
12 Occupancy and Substantial Completion.
- 13 C. Allow no other signs to be displayed without written approval of the County.

14 1.02 SUBMITTALS

- 15 A. Submit complete Shop Drawings identifying locations, material, layout, sign content, font
16 type and size, and sample colors. Make sign and lettering to scale, clearly indicating
17 condensed lettering if used. The sign details will be submitted to the County for approval
18 prior to fabrication.
- 19 B. Submit method of erection to include materials, fasteners, and other items to assure
20 compliance with the requirements for wind pressures as required by the authorities
21 having jurisdiction.
- 22 C. Submit signs in accordance with any details provided in the Drawings.
- 23 D. Prior to erection obtain and submit all required permits from the authorities having
24 jurisdiction.

25 1.03 PROJECT IDENTIFICATION SIGN

- 26 A. Provide 1 painted sign at the site, or at each end of the Work if a linear project, or at each of
27 the separate sites of Work, if applicable. The sign will be not less than 32-square feet area,
28 with a minimum dimension of 4-feet and painted graphics with content to include:
29 1. Title of Project
30 2. Orange County Government name and logo
31 3. Names and titles of the Board of County Commissioners, County Administrator,
32 Director of Orange County Utilities Department, the Consulting Engineer, and the
33 Contractor

- 1 B. Erect on the site at a lighted location of high public visibility, adjacent to main entrance
2 to site, as approved by the County. The sign must be located 5-feet from all rights-of-
3 way and 20-feet from all property lines.

4 1.04 INFORMATIONAL SIGNS

- 5 A. All signs and other traffic control devices shall conform to the requirements for shape,
6 color, size, and location as specified in the latest Manual on Uniform Traffic Control and
7 Safe Streets and Highways and the Florida Manual of Traffic Control and Safe Practices
8 for Street and Highway Construction, Maintenance and Utility Operations. Information
9 as to the above may be obtained from FDOT Division engineers.

10 **PART 2 - PRODUCTS**

11 2.01 SIGN MATERIALS

- 12 A. Structure and Framing: New construction grade lumber, structurally adequate and
13 suitable for exterior application and specified finish.
- 14 B. Sign Panels: New A-B Grade, exterior type, APA DF plywood with inset hardwood
15 edges and mitered corners, standard large sizes to minimize joints.
- 16 1. Thickness: As required by standards to span framing members, to provide even,
17 smooth surface without waves or buckles, minimum 3/4-inch.
- 18 C. Rough Hardware: Galvanized steel, of sizes and types to enable sign assemblies to resist
19 wind pressures as required by the authorities having jurisdiction but not less than a wind
20 velocity of 50-mph.
- 21 1. Use minimum 1/2-inch diameter button head carriage bolts to fasten sign panels to
22 supporting structures. Bolt heads to be painted to match sign face.
- 23 D. Paint: Exterior quality, as specified in Division 9 or as a minimum as specified herein.
- 24 1. Primer and finish coat: exterior, semi-gloss, alkyd enamel.
- 25 2. Colors for structure, framing, sign surfaces, and graphics: As shown on the Drawings
26 or as selected by the County.
- 27 E. Safety Sign Number Tags
- 28 1. Removable aluminum or galvanized steel, with 4-inch high, blue numerals and steel
29 tag hooks.

30 **PART 3 - EXECUTION**

31 3.01 PROJECT IDENTIFICATION SIGN

- 32 A. Install project identification signs within 10-days of the Notice to Proceed date. Failure
33 to erect the signs may be reason to delay approval of the initial Application for Payment.

- 1 B. Paint exposed surfaces of supports, framing, and surface material; one (1) coat of primer
2 and two (2) coats of finish paint.
- 3 C. Set signs plumb and level and solidly brace as required to prevent displacement during
4 the Construction period. If mounted on posts, sink posts 3-feet to 4-feet below grade,
5 leaving a minimum of 8-feet of each post above grade for mounting the sign.
- 6 D. Install informational signs at a height for optimum visibility, on ground mounted poles or
7 attached to temporary structural surfaces.

8 3.02 MAINTENANCE

- 9 A. Maintain signs and supports in a neat, clean condition; repair damages to structure,
10 framing, or sign.
- 11 B. Relocate informational signs as required by the progress of the Work.
- 12 C. Poorly maintained, defaced, damaged, or dirty signs shall be replaced, repaired, or
13 cleaned without delay.
- 14 D. Special care must be taken to ensure that construction materials and dust are not allowed
15 to obscure the face of a sign.
- 16 E. Signs not in effect shall be covered or removed.

17 3.03 REMOVAL

- 18 A. Remove signs, framing, supports, and foundations at Substantial Completion of the
19 Work.
- 20 B. Leave areas clean and patch as required to remove any traces of temporary signs.
21

22 END OF SECTION

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- 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

1 **SECTION 01610**

2 **DELIVERY, STORAGE AND HANDLING**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. This Section specifies the general requirements for the delivery, handling, storage and
6 protection for all items required in the construction of the Work.

7 B. Deliver, handle and store products in accordance with manufacturer's recommendations
8 and by methods and means that will prevent damage, deterioration, and loss including
9 theft and protect against damage from climatic conditions. Control delivery schedules to
10 minimize long-term storage of products at the site and overcrowding of construction
11 spaces. In particular, provide delivery/installation coordination to ensure minimum
12 holding or storage times for products recognized to be flammable, hazardous, easily
13 damaged, or sensitive to deterioration, theft and other sources of loss. Damaged or
14 defective items, in the opinion of the County, will be replaced at no cost to the County.

15 1.02 REQUIREMENTS

16 A. The Contractor is responsible for all material, equipment and supplies sold and delivered
17 to the County under this Contract until final inspection of the Work and acceptance
18 thereof by the County.

19 B. All materials and equipment to be incorporated in the Work will be handled and stored by
20 the Contractor before, during and after shipment in a manner to prevent warping,
21 twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any
22 kind whatsoever to the material or equipment.

23 C. All materials and equipment, which in the opinion of the County, have become so
24 damaged as to be unfit for the use intended or specified, will be promptly removed from
25 the site of the Work, and the Contractor will receive no compensation for the damaged
26 materials or equipment or for its removal.

27 D. In the event any such material, equipment and supplies are lost, stolen, damaged or
28 destroyed prior to final inspection and acceptance, the Contractor will replace same
29 without additional cost to the County.

30 1.03 DELIVERY

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

- 1 B. The County and the Contractor's project superintendent must be on-site to accept all
2 deliveries shipped directly to the job site. If the project superintendent is not present for a
3 delivery, that delivery may be rejected by the County. If any delivery is rejected due to
4 non-availability of the Contractor's project superintendent, delivery shall be rescheduled
5 at no additional cost to the County.
- 6 C. Schedule delivery to reduce long-term on-site storage prior to installation and/or
7 operation. Under no circumstances will materials or equipment be delivered to the site
8 more than 1-month prior to installation without written authorization from the County.
- 9 D. Coordinate deliveries in order to avoid delay in, or impediment of, the progress of the
10 Work.
- 11 E. Schedule deliveries to the site not more than 1-month prior to scheduled installation
12 without written authorization from the County.
- 13 F. Coordinate delivery with installation to ensure minimum holding time for items that are
14 hazardous, flammable, easily damaged or sensitive to deterioration.
- 15 G. All items delivered to the site will be unloaded and placed in a manner that will not
16 hamper the Contractor's normal construction operation or those of Subcontractors and
17 other Contractors and will not interfere with the flow of necessary traffic.
- 18 H. Deliver products in undamaged condition, in manufacturer's original containers or
19 packaging, with identifying labels intact and legible. Maintain packaged materials with
20 seals unbroken and labels intact until time of use.
- 21 I. Immediately on delivery, inspect shipments with the County to ensure compliance with
22 requirements of Contract Documents and accepted submittals, and that products are
23 properly protected and undamaged. If the Contractor does not notify the County
24 regarding the delivery and the County rejects any part of the delivery, there will be no
25 additional cost to the County for the material to be returned. For items furnished by
26 others (i.e. County), perform inspection in the presence of the County. Provide written
27 notification to the County of any problems.
- 28 J. Promptly remove damaged material and unsuitable items from the job site, and promptly
29 replace with material meeting the specified requirements, at no additional cost to the
30 County.

31 1.04 STORAGE AND HANDLING

- 32 A. Provide equipment and personnel to handle products by methods recommended by the
33 manufacturer to prevent soiling or damage to products or packaging, with seals and labels
34 intact and legible.
- 35 B. The Contractor is responsible for securing a location for on-site storage of all material
36 and equipment necessary for completion of the Work. The location and storage layout
37 will be submitted to the County at the Pre-Construction conference.

- 1 C. Manufacturer's storage instructions will be carefully studied by the Contractor and
2 reviewed with the County. These instructions will be carefully followed and a written
3 record of this kept by the Contractor.
- 4 D. All material delivered to the job site will be protected from dirt, dust, dampness, water,
5 and any other condition detrimental to the life of the material from the date of delivery to
6 the time of installation of the material and acceptance by the County.
- 7 E. When required or recommended by the manufacturer, the Contractor will furnish a
8 covered, weather protected storage structure providing a clean, dry, non-corrosive
9 environment for all mechanical equipment valves, architectural items, electrical and
10 instrumentation equipment, and special equipment to be incorporated into this Project.
- 11 F. Arrange storage in a manner to provide easy access for inspection. Make periodic
12 inspections of stored products to assure that products are maintained under specified
13 conditions and free from damage or deterioration.
- 14 G. Should the Contractor fail to take proper action on storage and handling of equipment
15 supplied under this Contract within 7-days after written notice to do so has been given,
16 the County retains the right to correct all deficiencies noted in previously transmitted
17 written notice and deduct the cost associated with these corrections from the Contract
18 Amount. These costs may be comprised of expenditures for labor, equipment usage,
19 administrative, clerical, engineering, and any other costs associated with making the
20 necessary corrections.

21 1.05 SPECIFIC STORAGE AND HANDLING

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

- 24 A. All mechanical and electrical equipment and instruments subject to corrosive damage by
25 the atmosphere if stored outdoors (even though covered by canvas) will be stored in a
26 weather tight building to prevent damage. The building may be a temporary structure on
27 the site or elsewhere, but it must be satisfactory to the County. The building will be
28 provided with adequate ventilation to prevent condensation. Maintain temperature and
29 humidity within range required by manufacturer.
- 30 1. All equipment will be stored fully lubricated with oil, grease and other lubricants
31 unless otherwise instructed by the manufacturer. Mechanical equipment to be used in
32 the Work, if stored for longer than 90-days, will have the bearings cleaned, flushed
33 and lubricated prior to testing and startup, at no extra cost to the County.
 - 34 2. Moving parts will be rotated a minimum of once weekly to ensure proper lubrication
35 and to avoid metal-to-metal "welding." Upon installation of the equipment, the
36 Contractor will start the equipment, at least half load, once weekly for an adequate
37 period of time to ensure that the equipment does not deteriorate from lack of use.

- 1 3. Lubricants will be changed upon completion of installation and as frequently as
2 required thereafter during the period between installation and acceptance. New
3 lubricants will be put into the equipment at the time of acceptance. Prior to
4 acceptance of the equipment, the Contractor will have the manufacturer inspect the
5 equipment and certify that its condition has not been detrimentally affected by the
6 long storage period. Such certifications by the manufacturer will be deemed to mean
7 that the equipment is judged by the manufacturer to be in a condition equal to that of
8 equipment that has been shipped, installed, tested and accepted in a minimum time
9 period. As such, the manufacturer will guaranty the equipment equally in both
10 instances. If such a certification is not given, the equipment will be judged to be
11 defective. It will be removed and replaced at the Contractor's expense.
- 12 4. Electric motors provided with heaters will be temporarily wired for continuous
13 heating during storage. Upon installation of the equipment, the Contractor will start
14 the equipment, at least half load, and once weekly for an adequate period of time to
15 insure that the equipment does not deteriorate from lack of use.
- 16 B. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent
17 mixing with foreign matter.
- 18 C. Cement and lime will be stored under a roof and off the ground and will be kept
19 completely dry at all times.
- 20 D. Brick, block and similar masonry products will be handled and stored in a manner to
21 minimize breakage, chipping, cracking and spilling to a minimum.
- 22 E. Precast Concrete will be handled and stored in a manner to prevent accumulations of dirt,
23 standing water, staining, chipping or cracking.
- 24 F. All structural and miscellaneous steel and reinforcing steel will be stored off the ground
25 or otherwise to prevent accumulations of dirt or grease, and in a position to prevent
26 accumulations of standing water and to minimize rusting. Beams will be stored with the
27 webs vertical.
- 28 G. Metals will be stored dry, all under cover and vented to prevent build-up of humidity, all
29 off ground to provide air circulation.
- 30 H. Lumber will be stacked to provide air circulation. Store materials for which maximum
31 moisture content is specified in an area where moisture content can be maintained.
- 32 I. Gypsum wallboard systems will be stored to protect all metal studs, furring, insulation
33 boards, batts, accessories and gypsum board to prevent any type of damage to these
34 materials. Rusted material components, damp or wet insulation or gypsum boards will
35 not be accepted.

1 J. Acoustical materials will be delivered to the job site in unbroken containers labeled and
2 clearly marked. Materials will not be removed from containers until ready to install, but
3 will be stored in dry area with cartons neatly stacked. Before installation, acoustical
4 board will be stored for not less than 24-hours in the Work area at the same temperature
5 and relative humidity.

6 K. Linear items will be stored in dry area with spacers to provide ventilation. Stack linear
7 items to prevent warping, complying with manufacturer's instructions.

8 L. Paints and other volatile materials will be stored within approved safety containers. No
9 glass jugs will be permitted. Storage areas will be equipped with not less than 2 fire
10 extinguishers (CO2 type) sufficient to discharge a distance of 25-feet when fully charged
11 and have current tags. No other building materials will be stored in this area. Used rags
12 will be removed daily. Clean rags will be stored in metal closed containers.

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

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

15

16

END OF SECTION

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- 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.

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- 1 D. Surveyor: Contractor's Surveyor that is licensed by the State of Florida as a Professional
2 Surveyor and Mapper pursuant to Chapter 472, F.S.
- 3 E. Survey Map Report: As a minimum the Survey Map Report shall identify any corners
4 that had to be reset, measurements and computations made, pump station and easement
5 boundary issues, locations of constructed improvements outside boundaries, and
6 accuracies obtained.

7 1.03 QUALITY ASSURANCE

- 8 A. Delegate the responsibility for maintenance of the Record Documents to one person on
9 the Contractor's staff as approved by the County.
- 10 B. Thoroughly coordinate changes within the Record Documents, making adequate and
11 proper entries on each page of specifications and each sheet of Drawings and other
12 documents where such entry is required to show progress and changes properly.
- 13 C. Make entries within 24-hours after receipt of information has occurred.

14 1.04 RECORD DOCUMENTS AT SITE

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

1 **PART 2 - PRODUCTS**

2 2.01 AS-BUILT DRAWINGS

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

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

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

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

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

12 F. Make entries in the pertinent other documents while coordinating with the County for
13 validity.

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

18 1. Depths of various elements of foundation in relation to finish floor datum and State
19 Plane Coordinates and elevations.

20 2. As-Built Asset Attribute Data Table shall be completed in the Drawings.

21 3. When electrical boxes, or underground conduits and plumbing are involved as part of
22 the Work, record true elevations and locations, dimensions between boxes.

23 4. Actually installed pipe or other work materials, class, pressure-rating, diameter, size,
24 specifications, etc. Similar information for other encountered underground utilities,
25 not installed by Contractor, their owner and actual location if different than shown in
26 the Contract Documents.

27 5. Details, not on original Contract Drawings, as needed to show the actual location of
28 the Work completed in a manner that allows the County to find it in the future.

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

32 7. Major architectural and structural changes including relocation of doors, windows,
33 etc. Architectural schedule changes according to Contractor's records and Shop
34 Drawings.

35 2.02 RECORD DOCUMENTS

36 A. Three (3) hard copy sets and three (3) digital media sets of the final Record Documents
37 and shall include all of the documents described below under this subsection 2.02.

- 1 B. The following documents shall be signed and sealed by the Surveyor:
2 1. As-Built Asset Attribute Data Table (see Specification Section 01050 "Surveying and
3 Field Engineering," Table 01050-2 for an example)
4 2. Boundary Survey of pump station and Survey Map Report
5 3. Boundary Survey and Survey Map Report for the location of constructed pipes ~~within~~
6 ~~any easements and right-of-way~~. As a minimum the Survey Map Report shall
7 identify or describe the locations where the pipe centerline was constructed ~~within 3-~~
8 ~~feet of the easement or right-of-way boundary, where the pipe was constructed~~
9 ~~outside the easement or right-of-way boundary~~, any corners that had to be reset,
10 measurements and computations made, ~~pump station boundary issues~~, and accuracies
11 obtained. Survey map report shall be dated after the Work ~~within the right-of-ways~~
12 ~~or easements~~ have been completed.
13 4. Gravity Main Table (see Specification Section 01050 "Surveying and Field
14 Engineering", Table 01050-4 for an example)
15 5. Pipe Deflection Table (see Specification Section 01050 "Surveying and Field
16 Engineering" Table 01050-3 for an example). An electronic blank table will be
17 supplied by the County.
- 18 C. Digital sets of the final Record Documents including but not limited to:
19 1. Scanned digital copies of the final As-Built Drawings
20 2. Electronic Survey documents electronically sealed by the Surveyor
21 3. Final Record Documents information
22 4. Digital As-Built Drawing in the Engineer's current version of AutoCAD file (dwg)
23 format for the Contract Drawings, updated to match the final Record Drawing
24 information
- 25 D. Pump station site Boundary Survey and Map Report.
- 26 E. New Boundary Survey to re-establish easement corners, right-of-way monuments, or
27 pump station site corners with monuments if destroyed by the Work.
- 28 F. Scanned Documents: Scan the Survey Documents and other Record Documents
29 reflecting changes from the Bid Documents.
- 30 G. The scanned "As-Built" Drawing sets shall be complete and include the title sheet,
31 plan/profile sheets, cross-sections, and details. Each individual sheet contained in the
32 printed set of the As-Built Drawings shall be included in the electronic drawings, with
33 each sheet being converted into an individual tif (tagged image file). The plan sheets
34 shall be scanned in tif format Group 4 at minimum of 400 dpi resolution to maintain
35 legibility of each drawing. Then, the tif images shall be embedded into a single pdf
36 (Adobe Acrobat) file representing the complete plan set. Review all Record Documents
37 to ensure a complete record of the Project.

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

8 **PART 3 - EXECUTION**

9 3.01 PRE-CONSTRUCTION MEETING

10 A. Pre-construction Meeting: It is recommended that the Surveyor attend the Pre-
11 construction meeting. At the pre-construction meeting the Contractor shall be provided
12 with a blank electronic version of the spreadsheet for the tables: Asset Attribute Data and
13 Pipe Deflection. The Contractor's surveyor shall use these tables to input the data and
14 shall not alter the table format or formulas.

15 3.02 CONSTRUCTION PROGRESS MEETINGS

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

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

1 9. Pipe Deflection Table: Surveyor shall input the type of pipe, pipe manufacturer, PVC
2 manufacturer deflection allowance, allowable angle of offset and radius of curvature,
3 laying length of pipe, and coordinates. Surveyor shall certify the data entered are
4 correct and indicate if the deflection allowance, offset or radius of curvature exceeds
5 the manufacturer's recommendations.

6 3.03 FINAL RECORD DOCUMENTS SUBMITTAL

7 A. Submit the Final Record Documents within 20-days after Substantial Completion.
8 1. Participate in review meetings as required and make required changes and promptly
9 deliver the Final Record Documents to the County.

10 3.04 STORAGE AND PRESERVATION

11 A. Store Record Documents and samples at a protected location in the project field office
12 apart from documents used for construction.
13 1. Provide files and racks for storage of documents
14 2. Provide locked cabinet or secure space for storage of samples

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

17 C. In the event of loss of recorded data, use means necessary to again secure the data to the
18 County's approval.
19 1. Such means shall include, if necessary in the opinion of the County, removal and
20 replacement of concealing materials.
21 2. In such cases, provide replacements of the concealing materials to the standards
22 originally required by the Contract Documents.
23

24 END OF SECTION

- 1 C. When a special warranty is required to be executed by the Contractor, or the Contractor
2 and a Subcontractor, supplier or manufacturer, prepare a written document that contains
3 appropriate terms and identification, ready for execution by the required parties. Submit
4 a draft to the County for approval prior to final execution.
- 5 D. Refer to individual Sections of Divisions 2 through 16 for specific content requirements,
6 and particular requirements for submittal of special warranties.
- 7 E. Prior to Substantial Completion Inspection, submit to the County two (2) copies of each
8 required warranty and bond properly executed by the Contractor, or by the Contractor,
9 Subcontractor, supplier, or manufacturer. Organize the warranty documents into an
10 orderly sequence based on the table of contents of the Project Manual.
- 11 1. Bind warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl
12 covered loose-leaf binders, thickness as necessary to accommodate contents and sized
13 to receive 8-1/2-inch by 11-inch three-hole punched paper.
- 14 2. Table of Contents will be neatly typed, in the sequence of the Table of Contents of
15 the Project Manual, with each item identified with the number and title of the
16 specification Section in which specified and the name of the product or work item.
- 17 3. Provide heavy paper dividers with celluloid covered tabs for each separate warranty.
18 Mark the tab to identify the product or installation. Provide a typed description of the
19 product or installation, including the name of the product and the name, address and
20 telephone number of the installer, supplier and manufacturer.
- 21 4. Identify each binder on the front and the spine with the typed or printed title
22 "WARRANTIES AND BONDS", the project title or name and the name, address and
23 telephone number of the Contractor.
- 24 5. When operating and maintenance manuals are required for warranted construction,
25 provide additional copies of each required warranty, as necessary, for inclusion in
26 each required manual.

27 1.05 WARRANTY REQUIREMENT

- 28 A. The Contractor will warrant all equipment in the Contractor's one-year warranty period
29 even though certificates of warranty may not be required. For all major pieces of
30 equipment, the Contractor shall submit a warranty from the equipment manufacturer.
31 "Major" equipment is defined as a device having a 5 HP or larger motor or which lists for
32 more than \$1,000.00.
- 33 B. In the event that an equipment manufacturer or supplier is unwilling to provide a one-
34 year warranty commencing at Substantial Completion, the Contractor will obtain from
35 the manufacturer a warranty of sufficient length commencing at the time of equipment
36 delivery to the job site, such that the warranty will extend to at least 1-year past
37 substantial completion.
- 38 C. If an individual specification section requires a particular warranty more stringent than
39 that required by this Section or the General Conditions, the more stringent requirements
40 will govern for the applicable portion of the Work.

- 1 D. Related Damages and Losses: When correcting warranted Work that has failed, remove
2 and replace other Work that has been damaged as a result of such failure or that must be
3 removed and replaced to provide access for correction of warranted Work.
- 4 E. Reinstatement of Warranty: When Work covered by a warranty has failed and been
5 corrected by replacement or rebuilding, reinstate the warranty by written endorsement.
6 The reinstated warranty will be equal to the original warranty with an equitable
7 adjustment for depreciation.
- 8 F. Replacement Cost: Upon determination that Work covered by a warranty has failed,
9 replace or rebuild the Work to an acceptable condition complying with requirements of
10 Contract Documents. The Contractor is responsible for the cost of replacing or
11 rebuilding defective Work regardless of whether the County has benefited from use of the
12 Work through a portion of its anticipated useful service life.
- 13 G. County's Recourse: Written warranties made to the County are in addition to implied
14 warranties, and will not limit the duties, obligations, rights and remedies otherwise
15 available under the law, nor will warranty periods be interpreted as limitations on time in
16 which the County can enforce such other duties, obligations, rights, or remedies.
- 17 H. Rejection of Warranties: The County reserves the right to reject warranties and to limit
18 selections to products with warranties not in conflict with requirements of the Contract
19 Documents.
- 20 I. The County reserves the right to refuse to accept Work for the project where a special
21 warranty, certification, or similar commitment is required on such work or part of the
22 Work, until evidence is presented that entities required to counter-sign such commitments
23 are willing to do so.
- 24 J. Disclaimers and Limitations: Manufacturer's disclaimers and limitations on product
25 warranties do not relieve the Contractor of the warranty on the Work that incorporates the
26 products, nor does it relieve suppliers, manufacturers, and Subcontractors required to
27 countersign special warranties with the Contractor.

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

29 **PART 3 - EXECUTION**

30 3.01 DELIVERABLES

- 31 A. Assemble warranties, bonds and service and maintenance contracts, executed by each of
32 the respective manufacturers, suppliers, and Subcontractors, and bind into a commercial
33 quality standard 3-ring binder; submit 5 copies of the warranties and bonds to the County
34 for review.
- 35 1. The warranties and bonds shall include:
36 a. Equipment or product description
37 b. Manufacturer's name, principal, address and telephone number

- 1 c. Contractor, name of responsible principal, address and telephone number
- 2 d. Local supplier's or representatives name and address
- 3 e. Scope of warranty or bond
- 4 f. Proper procedure in case of failure
- 5 g. Instances which might affect the validity of warranty or bond
- 6 h. Date of beginning of warranty, bond or service and maintenance contract
- 7 i. Duration of warranty, bond or service maintenance contract

8 B. Warranties

- 9 1. Furnish an extended warranty for sanitary sewer main liner certified by the
- 10 manufacturer for specified material properties for a particular job. The manufacturer
- 11 warrants the liner to be free from defects in raw materials for 1-year from the date of
- 12 acceptance. During the warranty period, any defects which affect the integrity or
- 13 strength of the pipe shall be repaired at the Contractor's expense in a manner
- 14 acceptable to the County.
- 15 2. Furnish an extended warranty for sanitary lateral liner certified by the manufacturer
- 16 for specified material properties for a particular job. The manufacturer warrants the
- 17 liner to be free from defects in raw materials for 1-year from the date of acceptance.
- 18 During the warranty period, any defects which affect the integrity or strength of the
- 19 pipe shall be repaired at the Contractor's expense in a manner acceptable to the
- 20 County.
- 21

22 END OF SECTION

- 1 B. Notices: Contractor shall issue written notices of planned demolition to companies or
2 local authorities owning utility conduit, wires, or pipes running to or through the project
3 site. Copies of said notices shall be submitted to the County.
- 4 C. Utility Services: Contractor shall notify utility companies or local authorities furnishing
5 gas, water, electrical, telephone, or sewer service to remove any equipment in the
6 structures to be demolished and to remove, disconnect, cap, or plug their services to
7 facilitate demolition.
- 8 D. Contractor shall notify the Orange County Risk Management Department in writing prior
9 to beginning any demolition work.

10 1.03 SHOP DRAWINGS AND SUBMITTALS

- 11 A. Submittals shall be submitted to the County for review and acceptance prior to
12 construction in accordance with the General Conditions and specifications Section 01300
13 "Submittals."
- 14 B. Submit to the County for their approval, 2 copies of proposed methods and operations of
15 demolition or relocation of the structures specified below prior to the start of Work.
16 Include in the schedule the coordination of shut-off, capping, and continuation of utility
17 service as required.
- 18 C. Provide a detailed sequence of demolition and removal work to ensure the uninterrupted
19 progress of the County's operations.
- 20 D. Before commencing demolition work, all structure relocation, bypassing, capping, or
21 modifications necessary will be completed. Actual work will not begin until the County
22 has inspected and approved the prerequisite work and authorized commencement of the
23 demolition work.
- 24 E. The above procedure must be followed for each individual demolition operation.

25 1.04 SITE CONDITIONS

- 26 A. Prior to demolition, the Contractor shall obtain written verification from the utility
27 owner(s) that the existing utilities, including stormwater, wastewater, and/or water
28 facilities, are not operational and are ready for demolition.
- 29 B. The County assumes no responsibility for the actual condition of the structures to be
30 demolished or relocated.
- 31 C. Conditions existing at the time of inspection for bidding purposes will be maintained by
32 the County insofar as practicable. However, variations within each site may occur prior
33 to the start of demolition work.
- 34 D. No additional payment will be made for pumping or other difficulties encountered due to
35 water.

1 E. Certain information regarding the reputed presence, size, character and location of
2 existing underground structures, pipes and conduit has been shown on the Drawings.
3 There is no certainty of the accuracy of this information, and the location of underground
4 structures shown may be inaccurate and other obstructions than those shown may be
5 encountered. The Contractor hereby distinctly agrees that the County is not responsible
6 for the correctness or sufficiency of the information given; that in no event is this
7 information to be considered as a part of the Contract; that he shall have no claim for
8 delay or extra compensation on account of incorrectness of information regarding
9 obstructions either revealed or not revealed by the Drawings; and that he shall have no
10 claim for relief from any obligation or responsibility under this Contract in case the
11 location, size, or character of any pipe or other underground structure is not as indicated
12 on the Drawings, or in case any pipe or other underground structure is encountered that is
13 not shown on the Drawings.

14 1.05 RESTRICTIONS

15 A. No water mains, fittings, valves, fire hydrants, street lighting, pavement, concrete, or any
16 part thereof, shall be demolished until an application has been filed by the Contractor
17 with the Building Department Inspector and a permit issued if a permit is required. The
18 fee for this permit shall be the Contractor's responsibility. Demolition shall be in
19 accordance with applicable provisions of the Building Code of the State of Florida.

20 B. No explosives shall be used at any time during the demolition. No burning of
21 combustible material will be allowed.

22 C. Contractor shall notify the Orange County Risk Management Department prior to
23 beginning any demolition work.

24 1.06 DISPOSAL OF MATERIAL

25 A. All salvageable or useable material or equipment to be retained by the County shall be
26 shown on Drawings, and shall be moved to a designated area by Contractor for pick up
27 by County. The Contractor shall promptly remove all other materials from the site as
28 indicated or shown on the Drawings.

29 B. All materials not retained by the County shall become the Contractor's property and shall
30 be removed off-site.

31 C. The on-site storage of removed items is prohibited by the County. Off-site sale of
32 salvageable material by the Contractor is acceptable.

33 1.07 TRAFFIC AND ACCESS

34 A. Conduct work to ensure minimum interference with on-site and off-site roads, streets,
35 sidewalks, and occupied or used facilities.

1 B. Special attention is directed towards maintaining safe and convenient access to the
2 existing facilities remaining in operation by plant personnel and plant associated vehicles,
3 including trucks and delivery vehicles.

4 C. Do not close or obstruct streets, sidewalks, or other occupied or used facilities without
5 permission from the County. Provide alternate routes around closed or obstructed traffic
6 in access ways.

7 1.08 PROTECTION

8 A. Conduct operations to minimize damage by falling debris or other causes to adjacent
9 buildings, structures, roadways, other facilities, and persons. Provide interior and
10 exterior shoring, bracing, or support to prevent movement or settlement or collapse of
11 structures to be demolished and adjacent facilities to remain.

12 1.09 DAMAGE

13 A. Promptly repair damage caused to adjacent facilities by demolition operations as directed
14 by the County at no cost to the County.

15 1.10 UTILITIES

16 A. Maintain existing utilities as directed by the County to remain in service and protect
17 against damage during demolition operations.

18 B. Do not interrupt existing utilities serving occupied or operational facilities, except when
19 authorized by County. Provide temporary services during interruptions to existing
20 utilities as acceptable to the County.

21 C. The Contractor shall cooperate with the County to shut off utilities serving structures of
22 the existing facilities as required by demolition operations.

23 D. The Contractor shall be solely responsible for making all necessary arrangements and for
24 performing any necessary work involved in connection with the interruption of all public
25 and private utilities or services.

26 E. All utilities being abandoned shall be terminated at the service mains in conformance
27 with the requirement of the utility companies or the municipality owning or controlling
28 them.

29 1.11 EXTERMINATION

30 A. If required, before starting demolition, the Contractor shall employ a certified rodent and
31 vermin exterminator and treat the facilities in accordance with governing health laws and
32 regulations. Any rodents, insects, or other vermin appearing before or during the
33 demolition shall be killed or otherwise prevented from leaving the immediate vicinity of
34 the demolition work.

1 1.12 POLLUTION CONTROL

2 A. For pollution control, use water sprinkling, temporary enclosures, and other suitable
3 methods as necessary to limit the amount of dust rising and scattering in the air to the
4 lowest level of air pollution practical for the conditions of work. The Contractor shall
5 comply with the governing regulations.

6 B. Clean adjacent structures and improvements of all dust and debris caused by demolition
7 operations as directed by the County. Return areas to conditions existing prior to the start
8 of Work.

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

10 **PART 3 - EXECUTION**

11 3.01 SEQUENCE OF WORK

12 A. The sequence of demolition and relocation of existing facilities shall be in accordance
13 with the approved critical path schedule as specified in paragraph 1.03 above.

14 3.02 REMOVAL OF EXISTING EQUIPMENT, PIPING, AND APPURTENANCES

15 A. Equipment to be retained by the County will be designated for retention by the County
16 prior to bidding as specified in Paragraph 1.06 above. Subject to the constraints of
17 maintaining existing facilities in operation as shown on the Drawings, all other process
18 equipment, buried and non-buried valving and piping, and appurtenances shall be
19 removed from the site.

20 3.03 DEMOLITION PROCEDURES

21 The Contractor shall adhere to the following demolition procedures as referenced on the
22 Drawings:

23 A. TO BE DEMOLISHED: Demolition shall be the breaking up, cutting, filling of any holes
24 resulting, final grading of the area, performing any other operations required, and the
25 removal from the site of all structures and equipment (piping, pavement, fittings,
26 electrical systems, light poles, wiring, underground conduits and wiring, isolated slabs,
27 and sidewalks) as indicated on the Drawings. All pieces of concrete, metal, and any other
28 demolished material shall be removed to a depth of at least 5-feet below existing grade.
29 Broken pieces of concrete may be size reduced by an on-site crusher, but in any event
30 must be removed from the project site.

31 B. TO BE REMOVED: Where indicated on the Drawings, the pavement, sidewalk,
32 concrete, light poles shall be completely removed from the site with all associated
33 connecting appurtenances or electrical service. The item shall be taken whole or in parts
34 to be salvaged or disposed of by the Contractor.

- 1 C. TO BE ABANDONED: Where indicated on the Drawings, the structures and equipment
2 shall be left in place, drained, and the contents properly disposed. The upper 4-feet of the
3 structure shall be cut and removed, including the cover slab and access port, frame, and
4 cover. All structures to be abandoned with bottom slabs shall be drilled (2 holes
5 minimum, 2.0-inch diameter each) or hole punched to prevent flotation and filled with
6 common fill.
- 7 D. PIPING TO BE REMOVED: Where indicated on the Drawings, pipe (and conduit) shall
8 be drained and the contents properly disposed. The pipe (or conduit) shall then be
9 completely removed from the site, including fittings, valves, and other in-line devices.
10 Connections to existing piping to remain shall be plugged by mechanical means (M.J.
11 plugs, tie-rods, or thrust blocks). Piping shall be removed in accordance with
12 Specification Section 02080 "Abandonment, Removal and Salvage or Disposal of
13 Existing Pipe."
- 14 E. PIPING TO BE ABANDONED: Where indicated on the Drawings, piping (or conduit)
15 shall be left in place. All such piping shall be drained and the contents properly disposed.
16 The pipe (or conduit) shall then be filled with grout (flowable fill) and each end of the
17 pipe (or conduit) shall be plugged using a concrete plug in a manner acceptable to the
18 County. Piping shall be abandoned in accordance with Specification Section 02080
19 "Abandonment, Removal and Salvage or Disposal of Existing Pipe."
- 20 F. TO BE PROTECTED: Where indicated on the Drawings, the utility service, fence,
21 structure, tree, or device so designated shall be temporarily protected during the
22 prosecution of the demolition work as specified in Division 1.
- 23 G. TO REMAIN: Where indicated on the Drawings, the designated facilities shall remain
24 intact and in service during the prosecution of the demolition work.

25 3.04 DEWATERING OF EXISTING PROCESS UNITS AND DISPOSAL OF RESIDUE

26 The Contractor shall notify the County prior to beginning the dewatering work on any
27 existing process units which contain wastewater, grit, or sludge. The Contractor, at his own
28 expense, shall remove the entire contents of each structure and dispose off site. The proper
29 transport and disposal of all residues shall remain the responsibility of the Contractor.
30

31 END OF SECTION

1 **SECTION 02080**

2 **ABANDONMENT, REMOVAL, AND SALVAGE OR DISPOSAL OF EXISTING PIPE**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. Scope of Work: This section specifies the furnishing of all labor, materials, equipment,
6 and incidentals required to abandon, remove, salvage, and/or dispose of existing pipelines
7 and appurtenances as shown on the Drawings and as specified herein.

8 1.02 QUALITY ASSURANCE

9 A. Permits and Licenses: Contractor shall obtain and pay respective fees for all necessary
10 permits and licenses for performing the Work and shall furnish a copy of same to the
11 County prior to commencing the Work. The Contractor shall comply with the
12 requirements of the permits. All removal or abandonment of asbestos pipe material shall
13 be performed by a licensed asbestos abatement Contractor or Subcontractor registered in
14 the State of Florida.

15 B. Notices: Contractor shall issue written notices of planned Work to companies or local
16 authorities owning utility conduit, wires, or pipes running to or through the project site.
17 Copies of said notices shall be submitted to the County.

18 C. Standards:

- 19 1. Florida Administrative Code, Chapter 62-204.800
20 2. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CFR Part 61,
21 Subpart M, latest revision
22 3. Occupational Safety and Health Act, 29 CFR
23 4. The Environmental Protection Agency (EPA) Asbestos Abatement Worker Protection
24 Rule
25 5. Florida Statute 455.300
26 6. Asbestos pipe handling best management practices provided at the end of this section

27 D. Quality Control

- 28 1. It shall be the responsibility of the Contractor to provide supervision and inspections
29 to ensure that the existing piping is removed and disposed, salvaged, or abandoned as
30 designated in the Drawings and as specified herein.
31 2. Asbestos Pipe
32 a. All removal or abandonment of pipe material containing asbestos shall be
33 performed by a licensed asbestos abatement Contractor or Subcontractor.

- 1 b. The asbestos abatement Contractor or Subcontractor shall contact the Orange
2 County Environmental Protection Division (407-836-1400) prior to removal or
3 abandonment of any asbestos material and shall obtain all required permits and
4 licenses and issue all required notices as required by the Orange County
5 Environmental Protection Division. The Contractor shall be responsible for all
6 fees associated with permits, licenses, and notices to the governing regulatory
7 agencies.
8 c. The asbestos abatement Contractor shall perform Work in accordance with all
9 applicable standards referenced in paragraph 1.02.C of this section.
10 d. The asbestos abatement Contractor shall have experience performing asbestos
11 removal similar to this Project.

12 1.03 SHOP DRAWINGS AND SUBMITTALS

- 13 A. Shop Drawings
14 1. Submittals shall be submitted to the County for review and acceptance prior to
15 construction in accordance with the General Conditions and specifications Section
16 01300 "Submittals."
17 2. Shop Drawings shall be submitted to the County for review and acceptance prior to
18 construction in accordance with these specifications for the following:
19 a. Piping
20 b. Restraints
21 c. Valves
22 d. All Piping Appurtenances
23 e. Asphalt Pavement Mix
24 f. Caps and plugs
25 g. Street Light Poles
26 h. Credentials of licensed asbestos abatement Contractor including current
27 certification.

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

29 **PART 3 - EXECUTION**

30 3.01 REMOVAL, ABANDONMENT, SALVAGE, AND DISPOSAL

- 31 A. General: Existing piping designated on the Drawings to be removed shall be exposed and
32 removed by the Contractor.
33 B. Removal and Disposal
34 1. Pipe designated to be removed shall be completely drained and the contents properly
35 disposed. The piping system including fittings and valves shall then be completely
36 removed from the site.
37 2. Existing services and/or connections not shown on the Drawings shall be removed in
38 accordance with this section at no additional cost. Existing live services encountered
39 shall be maintained.

- 1 3. Asbestos: Pipe material containing asbestos shall be removed and disposed by a
2 licensed asbestos abatement Contractor or Subcontractor.
- 3 4. Structures shall be removed in accordance with Section 02050 "Demolition of
4 Existing Structures."

5 C. Removal of material to be salvaged

- 6 1. Pipe designated on the Drawings to be removed and salvaged shall be completely
7 drained and the contents properly disposed. The pipe shall then be thoroughly
8 pressure washed, palletized on wooden skids to a dimension not exceeding the
9 recommendation of the manufacturer, and conveyed to the County at the location
10 designated by the County.
- 11 2. Items to be salvaged shall be determined by the County during the bid process:
 - 12 a. Valves
 - 13 b. Valve Boxes
 - 14 c. Fire Hydrants and valve assemblies

15 D. Abandonment (if approved by County)

- 16 1. Pipe designated on the Drawings to be abandoned (or retired in place) shall be left in
17 place, drained, and its contents properly disposed. Pipe requires end caps or plugs.
18 All air release valves and vaults, valve boxes, fire hydrants, manholes, and manhole
19 rings and covers shall be removed and disposed of or salvaged as specified above.
- 20 2. All pipe 4-inches or larger to be abandoned in place shall be completely filled with
21 grout and each end of the pipe shall be plugged in a manner acceptable to the County.
- 22 3. Grout: Where designated on the Drawings, pipe to be abandoned shall be filled with
23 grout in accordance with Section 03600 "Grouting."
- 24 4. Plugs: Pipe to be abandoned shall be capped or plugged with a mechanical joint
25 fitting that will prevent soil or other deposits from entering the pipe.

26 E. Asbestos Pipe Handling Best Management Practices

- 27 1. Projects will require worker documentation before entering the regulated Work area.
28 A copy of: their current training certificate (workers and their supervisor); current
29 medical condition showing the doctor approved their working with asbestos and
30 wearing a respirator; signed acknowledgment forms; and current record (6-months) of
31 each workers respirator fit test will be required from all workers.
- 32 2. Projects also require air monitoring. OSHA will accept historic data on air
33 monitoring within 12-months of the Project, provided the data is from a project of
34 like material and conditions with a crew of the same experience, supervision, and
35 training. Otherwise, monitoring is required throughout the Project. OSHA requires
36 two (2) types of personnel air monitoring, full shift and 30-minute excursion level
37 (when highest levels are anticipated).
- 38 3. Some provisions should be made for worker showering or otherwise washing
39 following work before removing respirators, etc. Even if direct exposure is not
40 anticipated, and at a minimum, a source of water to rinse the respirators, wash
41 workers faces and hands, and (in the event of unanticipated direct exposure) some
42 place to shower is required. The workers will also need a change room and some
43 place to keep their street clothes and personal possessions.

- 1 4. Proposals to remove asbestos pipe sections by cutting must address how the cutting
2 debris will be captured and kept from becoming airborne. Soil that could be
3 considered contaminated may also have to be removed.
- 4 5. Licensed asbestos abatement Contractors or Subcontractors should have a pollution
5 endorsement in their liability insurance in case of asbestos fiber release. A
6 contingency plan, in case the project does not run as smoothly as expected, should be
7 developed and include emergency phone numbers kept on site during the Project.
- 8 6. Daily logs of the asbestos removal work should be kept, and should include sign in
9 sheets for the workers and whatever air monitoring was done. Accident reports and
10 other reports or correspondence if something unusual happened should also be
11 included.
- 12 7. Waste receipts must be kept through all stages of transport from the site to, and
13 including, the acceptance at the dumpsite where the material will be abandoned.
14 Amount of material removed must be equal to the amount of material to be turned
15 into to the dump.
- 16 8. The primary Contractor will give "approval for tear down" at project completion,
17 indicating that all asbestos removal operations are complete and whether there is a
18 need for any air monitoring. Air monitoring, if not required by any governing agency
19 or approved permit as discussed previously, may also be required by the County if
20 documentation to the general public pertaining to contamination is deemed necessary.
21 This air monitoring is normally done by collecting area samples downwind of the
22 project at the barrier tape or just inside it. It requires a source of electricity to run the
23 pumps, which is often provided by a generator.
24

25 END OF SECTION

- 1 D. Concrete block: hollow, non-load bearing type.
- 2 E. Concrete: exterior grade not less than 1-inch thick.
- 3 F. Rock Bags: conforming to FDOT Specifications.

4 2.03 TURBIDITY CONTROL

- 5 A. Conforming to FDOT Design Standards Index 103 - Turbidity Barriers.

6 **PART 3 - EXECUTION**

7 3.01 EROSION CONTROL

- 8 A. Minimum Procedures for Grassing Are:

- 9 1. Scarify slopes to a depth of not less than 6-inches and remove large clods, rock,
- 10 stumps and roots larger than 1/2-inch in diameter and debris.
- 11 2. Sow seed within 24-hours after the ground is scarified with either mechanical seed
- 12 drills or rotary hand seeders.
- 13 3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2-inches.
- 14 4. Apply netting over mulched areas on sloped surfaces.
- 15 5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and
- 16 growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and
- 17 seed eroded areas.

18 3.02 SEDIMENTATION CONTROL

- 19 A. Install and maintain silt fence, silt dams, traps, barriers and appurtenances as shown on
- 20 the approved descriptions and working Drawings. Synthetic bales which deteriorate and
- 21 filter stone which is dislodged shall be replaced.

22 3.03 TURBIDITY CONTROL

- 23 A. Install and maintain turbidity barriers daily and as described in FDOT Index #103.

24 3.04 PERFORMANCE

- 25 A. Should any of the temporary erosion and sediment control measures employed by the
- 26 Contractor fail to produce results which comply with the requirements of the State of
- 27 Florida, the Contractor shall immediately take whatever steps are necessary to correct the
- 28 deficiency at his own expense.

29 **END OF SECTION**

- 1 C. Provide notification to all jurisdictional permitting agencies in accordance with the
2 requirements of the respective agency.
- 3 D. Provide a detailed plan and operation schedule for dewatering of excavations.
4 1. Provide descriptive literature of the dewatering system.
5 2. Provide a plan for erosion and sedimentation control during dewatering.
6 3. Provide copies of all permits/approvals for disposal/discharge of water during
7 dewatering.

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

9 **PART 3 - EXECUTION**

10 3.01 GENERAL

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

1 3.02 DEWATERING AND DISPOSAL

- 2 A. The Contractor shall construct and place all pipelines, structures, concrete work,
3 structural fill, backfill and bedding material in-the-dry. In addition, the Contractor shall
4 make the final 24-inches of excavation in-the-dry and not until the water level is a
5 minimum of 2-foot below proposed bottom of excavation. For purposes of this Contract,
6 in-the-dry is defined as $\pm 2\%$ of the optimum moisture content of the soil.
- 7 B. The Contractor shall, at all times during construction, provide and maintain proper
8 equipment and facilities to remove promptly and dispose of all water entering
9 excavations. Contractor shall keep excavations dry so as to obtain a satisfactory
10 undisturbed subgrade foundation condition until the fill, structure, or pipes have been
11 completed to such extent that they will not be floated or otherwise damaged by allowing
12 water levels to return to natural elevations.
- 13 C. Dewatering shall at all times be conducted in such a manner as to preserve the natural
14 undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
- 15 D. It is expected that dewatering will be required for pre-drainage of the soils prior to final
16 excavation for most of the in-ground structures or piping and for maintaining the lowered
17 groundwater level until construction has been completed so that the structure, pipeline or
18 fill will not be floated or otherwise damaged.
- 19 E. If wellpoints are used, Contractor shall adequately space wellpoints to maintain the
20 necessary dewatering. Provide suitable filter sand and/or other means to prevent
21 pumping of fine sands and silts. A continual check shall be maintained by the Contractor
22 to ensure that the subsurface soil is not being removed by the dewatering operations.
23 Pumping from wellpoints shall be continuous and standby pumps shall be provided.
- 24 F. The Contractor's proposed method of dewatering shall include groundwater observation
25 wells to determine the water level during construction. Observation wells shall be
26 installed along pipelines as required to verify depth to water level and at locations
27 approved by the County.
- 28 G. At all times, site grading shall promote drainage. Surface runoff shall be diverted from
29 excavations. Water entering the excavation from the surface shall be collected in shallow
30 ditches around the perimeter of the excavation, drained to sumps, and pumped or drained
31 by gravity to maintain an excavation bottom free from standing water.
- 32 H. Flotation shall be prevented by the Contractor by maintaining a positive and continuous
33 removal of water. The Contractor shall be fully responsible for all damages which may
34 result from failure to adequately keep excavations dewatered.
- 35 I. The Contractor shall dispose of water from the Work in a suitable manner without
36 damage to adjacent properties or facilities. No water shall be discharged without
37 appropriate treatment for adverse contaminants. No water shall be drained in work built
38 or under construction without prior consent from the County. Water shall be filtered to
39 remove sand and fine soil particles before disposal into any drainage system.

1 J. Dewatering of excavations shall be considered incidental to the construction of the Work
2 and all costs shall be included in the various Contract prices in the Bid Form, unless a
3 separate bid item has been established for dewatering.

4 3.03 GROUNDWATER TREATMENT (IF REQUIRED)

5 A. If concentrations of tested groundwater quality parameters exceed those allowable in the
6 FDEP Generic Permit for the Discharge of Produced Groundwater from any Non-
7 Contaminated Site Activity (62-621.300(2), F.A.C.), the Contractor shall treat the
8 effluent.

9 B. The Contractor shall immediately notify the County and discuss the parameters that
10 exceed allowable limits.

11 C. The Contractor shall meet with the FDEP to determine alternatives that are acceptable to
12 the FDEP.

13 D. The Contractor shall apply for and obtain any and all permits and/or treatment approvals
14 that FDEP requires including but not limited to:

- 15 1. Generic Permit for Discharges from Petroleum Contaminated Sites (62-621.300(1)).
16 Allows discharges from sites with automotive gasoline, aviation gasoline, jet fuel, or
17 diesel fuel contamination; or
- 18 2. Permit for all Other Contaminated Sites (62-04; 62-302; 62-620 & 62-660). The
19 coverage is available only through the individual NPDES permit issued by FDEP,
20 allows discharges from sites with general contaminant issues i.e. ground water and/or
21 soil contamination other than petroleum fuel contamination; or
- 22 3. Generic Permit for the Discharge of Produced Ground Water from Any Non-
23 Contaminated Site Activity (62-621.300(2), F.A.C.); or
- 24 4. Generic Permit for Stormwater Discharge from Large or Small Construction
25 Activities (62-621.300(4)(a), F.A.C.); or
- 26 5. An Individual Wastewater Permit (62-604.300(8) (a)

27 E. The Contractor shall implement the appropriate treatment that is acceptable to FDEP and
28 County to attain compliance for all excess limits encountered during dewatering
29 activities. Treatment may include, but is not limited to: Chemical, Biological,
30 Electrolysis or any combination of the three.

31 F. The Contractor shall make every effort to minimize the spread of contamination into
32 uncontaminated areas. Provide for the health and safety of all workers at the job site and
33 make provisions necessary for the health and safety of the public that may be exposed to
34 any potentially hazardous conditions. Ensure provision adhere to all applicable laws,
35 rules or regulations covering hazardous conditions and will be in a manner commensurate
36 with the level of severity of the conditions.

37 G. If necessary, provide contamination assessment and remediation personnel to handle site
38 assessment, determine the course of action necessary for site security and perform the
39 necessary steps under applicable laws, rules and regulations for additional assessment
40 and/or remediation work to resolve the contaminations issue.

- 1 H. Delineate the contamination area(s) and any staging or holding area required and develop
2 a work plan that will provide the schedule of projected completion dates for the final
3 resolution of the contamination issue.

- 4 I. Maintain jurisdiction over activities inside any delineated contamination areas and any
5 associated staging or holding areas. Be responsible for the health and safety of workers
6 within the delineated areas. Provide continuous access to representatives of regulatory or
7 enforcement agencies having jurisdiction.

8 3.04 REMOVAL

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

14 END OF SECTION

1

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- 1 B. Cut out areas to subgrade elevation which are to receive stabilizing base for paving and
2 sidewalks.
- 3 C. Bring sub soil to required levels, profiles, and contours. Make changes in grade gradual.
4 Blend slopes into level areas.
- 5 D. Slope grade away from building a minimum of 2-inches in 10-feet unless indicated
6 otherwise on the Drawings.
- 7 E. Cultivate subgrade to a depth of 3-inches where topsoil is to be placed. Repeat
8 cultivation in areas where equipment used for hauling and spreading topsoil has
9 compacted sub-soil.

10 3.02 PLACING TOPSOIL

- 11 A. Place topsoil in areas where seeding, sodding, and planting is to be performed. Place to
12 the following minimum depths, up to finished grade elevations.
13 1. 6-inches for seeded areas
14 2. 4-1/2-inches for sodded areas
15 3. 24-inches for shrub beds
16 4. 18-inches for flower beds
- 17 B. Use topsoil in relatively dry state. Place during dry weather.
- 18 C. Fine grade topsoil eliminating rough and low areas to ensure positive drainage. Maintain
19 levels, profiles, and contours of subgrades.
- 20 D. Remove stones, roots, grass, weeds, debris, and other foreign material while spreading.
- 21 E. Manually spread topsoil around trees, plants, and buildings to prevent damage which may
22 be caused by grading equipment.
- 23 F. Lightly compact placed topsoil.

24 3.03 SURPLUS MATERIAL

- 25 A. Remove surplus sub soil and topsoil from site.
- 26 B. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.
27

28 END OF SECTION

1 1.02 QUALITY ASSURANCE

2 A. Testing laboratory employed by the County will make such tests as are deemed advisable.
3 The Contractor shall schedule his work to permit a reasonable time for testing before
4 placing succeeding lifts and shall keep the laboratory informed of his progress. Costs for
5 initial testing shall be paid by the County; however, tests which have to be repeated
6 because of the failure of the tested material to meet specification shall be paid for by the
7 Contractor and the cost of re-testing shall be deducted from payments due the Contractor.

8 B. Standards

- 9 1. AASHTO: American Association of State Highway and Transportation Officials
10 2. ANSI: American National Standards Institute
11 3. ASCE: American Society of Civil Engineers
12 4. ASTM: American Society for Testing and Materials
13 5. AWWA: American Water Works Association
14 6. OSHA 29 CFR Subpart P – Excavations and Trenches a) 1926.650, 1926.651,
15 1926.652
16 7. OSHA 29 CFR Subpart J - a) 1910.146 for Confined Space Entry

17 1.03 JOB CONDITIONS

18 A. Existing Utilities

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

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

31 1.04 PROTECTION

32 A. Sheet piling and Bracing (if required)

- 33 1. Requirements of the Trench Safety Act shall be adhered to at all times.

- 1 2. Furnish, put in place, and maintain such sheeting and bracing as may be required to
2 support the sides of excavations, to prevent any movement which could in any way
3 diminish the width of the excavation below that necessary for proper construction, to
4 protect adjacent structures and power poles from undermining, and to protect workers
5 from hazardous conditions or other damage. Such support shall consist of braced
6 steel sheet piling, braced wood lagging and soldier beams or other acceptable
7 methods. If the County is of the opinion that at any point sufficient or proper
8 supports have not been provided, the County may order additional supports put in at
9 the expense of the Contractor, and compliance with such order shall not relieve or
10 release the Contractor from his responsibility for the sufficiency of such supports.
11 Care shall be taken to prevent voids outside of the sheeting, but if voids are formed,
12 they shall be immediately filled and compacted. Where soil cannot be properly
13 compacted to fill a void, lean concrete shall be used as backfill at no additional
14 expense to the County.
- 15 3. The Contractor shall construct the sheeting outside the neat lines of the foundation
16 unless indicated otherwise for the method of operation. Sheeting shall be plumb and
17 securely braced and tied in position. Sheeting and bracing shall be adequate to
18 withstand all pressure to which the structure or trench will be subjected. Any
19 movement or bulging which may occur shall be corrected by the Contractor at their
20 own expense so as to provide the necessary clearances and dimensions.
- 21 4. Where sheeting and bracing is required to support the sides of excavations for
22 structures, the Contractor shall engage a Professional Geotechnical Engineer,
23 registered in the State of Florida, to design the sheeting and bracing. The sheeting
24 and bracing installed shall be in conformity with the design, and the Professional
25 Engineer shall provide certification of this.
- 26 5. The installation of sheeting, particularly by driving or vibrating, may cause distress to
27 existing structures. The Contractor shall evaluate the potential for such distress and,
28 if necessary, take all precautions to prevent distress of existing structures because of
29 sheeting installation.
- 30 6. The Contractor shall leave in place to be embedded in the backfill all sheeting and
31 bracing not shown on the Drawings but which the County may direct him in writing
32 to leave in place at any time during the progress of the Work for the purpose of
33 preventing damage to structures, utilities, or property, whether public or private. The
34 County may direct that timber used for sheeting and bracing be cut off at any
35 specified elevation.
- 36 7. All sheeting and bracing not left in place shall be carefully removed in such manner
37 as not to endanger the construction or other structures, utilities, or property. All voids
38 left or caused by withdrawal of sheeting shall be immediately refilled with sand by
39 ramming with tools especially adapted to that purpose, or otherwise as may be
40 directed by the County.
- 41 8. The right of the County to order sheeting and bracing left in place shall not be
42 construed as creating any obligation on the County's part to issue such orders, and
43 their failure to exercise this right shall not relieve the Contractor from liability for
44 damages to persons or property occurring from or upon the Work occasioned by
45 negligence or otherwise, growing out of a failure on the part of the Contractor to
46 leave in place sufficient sheeting and bracing to prevent any caving or moving of the
47 ground.

- 1 9. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and
2 under no circumstances shall any wood sheeting be cut off at a level lower than 1-foot
3 above the top of any pipe.

4 B. Pumping and Drainage:

- 5 1. The Contractor shall at all times during construction provide and maintain proper
6 equipment and facilities to remove all water entering excavations, and shall keep such
7 excavations dry so as to obtain a satisfactory undisturbed subgrade foundation
8 condition until the fills, structures, or pipes to be built thereon have been completed to
9 such extent that they will not be floated or otherwise damaged by allowing the water
10 level to return to the natural level as stipulated in Section 02140 "Dewatering." The
11 Contractor shall engage a Professional Geotechnical Engineer registered in the State
12 of Florida to design the dewatering systems. The Contractor shall submit to the
13 County for a plan for dewatering systems prior to commencing work. The dewatering
14 system installed shall be in conformity with the overall construction plan, and the
15 Professional Engineer shall provide certification of this. The Professional Engineer
16 shall be required to monitor the performance of the dewatering systems during the
17 progress of the Work and require such modifications as may be required to assure that
18 the systems are performing satisfactorily.
- 19 2. Dewatering shall at all times be conducted in such a manner as to preserve the
20 undisturbed bearing capacity of the subgrade soils at the proposed bottom of
21 excavation and to preserve the integrity of adjacent structures. Dewatering by trench
22 pumping will not be permitted if migration of fine grained natural material from
23 bottom, sidewalls, or bedding material will occur.
- 24 3. Water entering the excavation from surface runoff shall be collected in shallow
25 ditches around the perimeter of the excavation, drained to sumps, and pumped from
26 the excavation to maintain a bottom free from standing water.
- 27 4. The Contractor shall take all additional precautions to prevent uplift of any structure
28 during construction.
- 29 5. Permission to use any storm sewers or drains for water disposal purposes shall be
30 obtained from the authority having jurisdiction. Any requirements and costs for such
31 use shall be the responsibility of the Contractor. However, the Contractor shall not
32 cause flooding by overloading or blocking up the flow in the drainage facilities, and
33 he shall leave the facilities unrestricted and as clean as originally found. Any damage
34 to facilities shall be repaired or restored as directed by the County or the authority
35 having jurisdiction, at no cost to the County.
- 36 6. The Contractor shall prevent flotation by maintaining a positive and continuous
37 operation of the dewatering system. The Contractor shall be fully responsible and
38 liable for all damages which may result from failure of this system.
- 39 7. Removal of dewatering equipment shall be accomplished after compaction/density
40 testing has been completed and the system is no longer required. The Contractor
41 shall remove the material and equipment constituting the system.
- 42 8. The Contractor shall take all necessary precautions to preclude the accidental
43 discharge of fuel, oil, or other contaminants in order to prevent adverse effects on
44 groundwater quality.

1 1.05 TESTING AND INSPECTION SERVICE

2 A. The County will provide a geotechnical testing and inspection service. The services
3 include testing soil materials and quality control testing during filling and backfilling
4 operations. Samples of soil materials shall be furnished to the testing service by the
5 Contractor. The County shall pay costs of initial geotechnical testing. The Contractor
6 shall pay for any subsequent testing required due to failure and laboratory stand-by
7 charges incurred.

8 B. The Contractor shall provide monthly density testing reports to the County during
9 backfilling activities. Density testing reports not submitted in a timely manner shall
10 result in rejection of the pipe installed and rejection of the density testing reports until
11 such time that density re-testing is coordinated and repeated at the Contractors expense.

12 C. Density testing scheduled subsequent to backfilling activities shall be coordinated with,
13 and witnessed by the County. Failure by the Contractor to coordinate or have the County
14 present shall result in rejection of the submitted density testing reports and re-testing at
15 the Contractor's expense.

16 D. Dewatering systems shall not be removed until compaction/density testing has been
17 completed.

18 **PART 2 - PRODUCTS**

19 2.01 MATERIALS

20 A. General:
21 1. All fill material shall be subject to the review and acceptance of the County.
22 2. All fill material shall be free of organic material, trash, or other objectionable
23 material. The Contractor shall remove excess or unsuitable material from the job site.

24 B. Common Fill Material: Common fill shall consist of mineral soil, substantially free of
25 clay, organic material, muck, loam, wood, trash, and other objectionable material which
26 may be compressible or which cannot be compacted properly. Common fill shall not
27 contain stones larger than 3-1/2-inches in any dimension in the top 12-inches or 6-inches
28 in any dimension in the balance of fill area. Common fill shall not contain asphalt,
29 broken concrete, masonry, rubble or other similar materials. It shall have physical
30 properties that allow it to be easily spread and compacted during filling. Additional
31 common fill shall be no more than 12 % by weight finer than the No. 200 mesh sieve,
32 unless finer material is approved for use in a specific location by the County. Select
33 Common Fill shall be as specified as above from common fill, except that the material
34 shall contain no stones larger than 1/2-inches in largest dimension, and shall be no more
35 than 5 % by weight finer than the No. 200 mesh sieve.

1 C. Structural Fill: Structural fill shall be reasonably well graded sand to gravelly sand
2 having the following gradation:
3

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

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

8 Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay,
9 loam or organic matter, conforming to ASTM C33 stone size No. 89 and with particle
10 size limits as follows:
11

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

12 E. Class II Soils**:

- 13 1. GW: Well graded gravels and gravel-sand mixtures, little or no fines. Fifty percent or
14 more retained on No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
- 15 2. GP: Poorly graded gravels and gravel-sand mixtures, little or no fines. Fifty percent
16 or more retained on No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
- 17 3. SW: Well graded sands and gravelly sands, little or no fines. More than passes No.
18 4 sieve. More than 95 % retained on No. 200 sieve. Clean.
- 19 4. SP: Poorly graded sands and gravelly sands, little or no fines. More than 50 % passes
20 No. 4 sieve. More than 95 % retained on No. 200 sieve. Clean.

21

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

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

1 F. Coarse Sand: Sand shall consist of clean mineral aggregate with particle size limits as
2 follows:
3

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

4 G. Other Material: All other material, not specifically described, but required for proper
5 completion of the Work shall be selected by the Contractor and acceptable by the County.

6 **PART 3 - EXECUTION**

7 3.01 PREPARATION

8 A. Clearing:

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

12 3.02 EXCAVATION

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

15 B. Excavating for Roadways/Structures/Utilities:

- 16 1. Excavation shall be made to such dimensions as will give suitable room for building
17 the foundations and the structures, for bracing and supporting, for pumping and
18 draining, and for all other work required.
19 a. Excavation for precast or prefabricated structures shall be carried to an elevation
20 2-feet lower than the proposed outside bottom of the structure to provide space for
21 the select backfill material. Prior to placing the select backfill, the excavation
22 shall be measured by the County to verify that the excavation has been carried to
23 the proper depth and is reasonably uniform over the area to be occupied by the
24 structure.
25 b. Excavation for structures constructed or cast in place in dewatered excavations
26 shall be carried down to the bottom of the structure where dewatering methods are
27 such that a dry excavation bottom is exposed and the naturally occurring material
28 at this elevation leveled and left ready to receive construction. Material disturbed
29 below the founding elevation in dewatered excavations shall be replaced with
30 Class B concrete.
31 c. Footings: Cast-in-place concrete footing sides shall be formed immediately after
32 excavation.
33 2. Immediately document the location, elevation, size, material type and function of all
34 new subsurface installations, and utilities encountered during the course of
35 construction.

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

16 3.03 DRAINAGE

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

32 3.04 UNDERCUT

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

1 3.05 FILL AND COMPACTION

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

4
5 STRUCTURES AND ROADWORK
6

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.

7 B. Pipe shall be laid in open trenches unless otherwise indicated on the Drawings or
8 elsewhere in the Contract Documents.

9 C. Excavations shall be backfilled to the original grade or as indicated on the Drawings.
10 Deviation from this grade because of settling shall be corrected. The backfill operation
11 shall be performed to comply with all rules and regulations and in such a manner that it
12 does not create a nuisance or safety hazard.

13 D. Embankments shall be constructed true to lines, grades, and cross sections shown on the
14 plans or ordered by the County. Embankments shall be placed in successive layers of not
15 more than 8-inches in thickness, loose measure, for the full width of the embankment. As
16 far as practicable, traffic over the Work during the construction phase shall be distributed
17 so as to cover the maximum surface area of each layer.

18 E. If the Contractor requests approval to backfill material utilizing lifts and/or methods other
19 than those specified herein, such request shall be in writing to the County. Acceptance
20 will be considered only after the Contractor has performed tests, at the Contractor's
21 expense, to identify the material used and density achieved throughout the backfill area
22 utilizing the method of backfill requested. The County's acceptance shall be in writing.

23 F. One compaction test location shall be required for each 300 linear feet of pipe and for
24 every 100 square feet of backfill around structures as a minimum. The County may
25 determine that more compaction tests are required to certify the installation depending on
26 field conditions. The locations of the compaction tests within the trench shall be in
27 conformance with the following schedule:

- 28 1. At least one test at the spring line of the pipe.

1 2.01 GENERAL

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

4 B. The Contractor may choose the type of stabilizing material.

5 C. Materials may be limerock, shell rock, cemented coquina, or shell-base sources approved
6 by the FDOT.

7 D. At least 97% by weight of the total material shall pass a 3-1/2-inch (90-mm) sieve.
8 Material having a plasticity index greater than 10 or a liquid limit greater than 40 shall
9 not be used as a stabilizer.

10 2.02 LIMEROCK

11 A. For limerock, carbonates of calcium and magnesium shall be at least 70%.

12 2.03 CRUSHED SHELL

13 A. Crushed shell for this use shall be mollusk shell (i.e., oysters, mussels, clams, cemented
14 coquina). Steamed shell will not be permitted.

15 B. At least 50% by weight of the total material shall be retained on the No. 4 (4.75 µm) sieve.

16 C. Not more than 20% by weight of the total material shall pass the No. 200 (75 µm) sieve. The
17 determination of the percentage passing the No. 200 (75 µm) sieve shall be by washing only.

18 2.04 LOCAL MATERIALS

19 A. Local materials used for this stabilizing may be soils or recyclable materials such as crushed
20 concrete, roof tiles, asphalt coated base, or reclaimed pavement. However, no materials that
21 deteriorate over time, cause excessive deformations, contain hazardous substances,
22 contaminates, or do not improve the bearing capacity of the stabilized material may be used.

23 **PART 3 - EXECUTION**

24 3.01 GENERAL

25 A. Prior to the beginning of stabilizing operations, construct the area to be stabilized to an
26 elevation such that, upon completion of stabilizing operations, the completed stabilized
27 subgrade will conform to the lines, grades, and cross-section shown in the plans. Prior to
28 spreading any additive stabilizing material, bring the surface of the roadbed to a plane
29 approximately parallel to the plane of the proposed finished surface.

30 B. Process the subgrade to be stabilized in 1 course, unless the equipment and methods
31 being used do not provide the required uniformity, particle size limitation, compaction,

1 and other desired results, in which case, the County will direct that the processing be
2 done in more than 1 course.

3 3.02 APPLICATION OF STABILIZING MATERIAL

4 A. When additive stabilizing materials are required, spread the designated quantity
5 uniformly over the area to be stabilized.

6 B. When materials from an existing base are to be used in the stabilizing at a particular location,
7 place and spread all of such materials prior to the addition of other stabilizing additives.

8 C. Spread commercial stabilizing material by the use of mechanical material spreaders,
9 except that where use of such equipment is not practicable, use other means of spreading,
10 but only upon written approval of the proposed alternate method.

11 3.03 MIXING

12 A. Perform mixing using rotary tillers or other equipment meeting the approval of the
13 County. The Contractor may mix the materials in a plant of an approved type suitable for
14 this Work. Thoroughly mix the area to be stabilized throughout the entire depth and
15 width of the stabilizing limits.

16 B. Perform the mixing operations as specified (either in place or in a plant) regardless of
17 whether the existing soil, or any select soils placed within the limits of the stabilized
18 sections, have the required bearing value without the addition of stabilizing materials.

19 3.04 MAXIMUM PARTICLE SIZE OF MIXED MATERIALS

20 A. At the completion of the mixing, ensure that the gradation of the material within the
21 limits of the area being stabilized is such that 97% will pass a 3-1/2-inch sieve and that
22 the material does not have a plasticity index greater than 8 or liquid limit greater than 30.
23 Note that clay balls or lumps of clay size particles (2 microns or less) cannot be
24 considered as individual particle sizes. Remove any materials not meeting the plasticity
25 requirements from the stabilized area. The Contractor may break down or remove from
26 the stabilized area materials not meeting the gradation requirements.

27 3.05 COMPACTION

28 A. Compact the materials at a moisture content permitting the specified compaction. If the
29 moisture content of the material is improper for attaining the specified density, either add
30 water or allow the material to dry until reaching the proper moisture content for the
31 specified compaction.

32 3.06 FINISH GRADING

33 A. Shape the completed stabilized subgrade to conform to the finished lines, grades, and
34 cross-section indicated in the Drawings. Check the subgrade using elevation stakes or

1 other means approved by the County.

2 3.07 CONDITION OF COMPLETED SUBGRADE

3 A. After completing the stabilizing and compacting operations, ensure that the subgrade is
4 firm and substantially unyielding to the extent that it will support construction equipment
5 and will have the bearing value required by the Drawings.

6 B. Remove all soft and yielding material, and any other portions of the subgrade that will
7 not compact readily. Replace yielding material with suitable material so that the whole
8 subgrade is brought to line and grade with proper allowance for subsequent compaction.

9 3.08 MAINTENANCE OF COMPLETED SUBGRADE

10 A. After completing the subgrade, maintain it free from ruts, depressions, and any damage
11 resulting from the hauling or handling of materials, equipment, and tools. The Contractor
12 is responsible for maintaining the required density until the subsequent base or pavement
13 is in place including any repairs or replacement of curb and gutter or sidewalk which
14 might become necessary in order to recompact the subgrade in the event of underwash or
15 other damage occurring to the previously compacted subgrade. Perform any such
16 recompaction at no expense to the County. Construct and maintain ditches and drains
17 along the completed subgrade section.

18 3.09 FIELD QUALITY CONTROL

19 A. When proper moisture conditions are attained, compact the material to not less than 98%
20 of maximum density determined by AASHTO T-180, and a minimum LBR of 40.
21

22 END OF SECTION

- 1 C. The liquid limit shall not exceed 35 and the material shall be non-plastic.
- 2 D. Limerock material shall not contain cherty or other extremely hard pieces, lumps, balls,
3 or pockets of sand or clay size material in sufficient quantity as to be detrimental to the
4 proper bonding, finishing, or strength of the limerock base.
- 5 E. At least 97% (by weight) of the material shall pass a 3-1/2-inch sieve and the material
6 shall be graded uniformly to dust. The fine material shall consist entirely of dust of
7 fracture. All crushing or breaking-up which might be necessary in order to meet such size
8 requirements shall be done before the material is placed on the road.
- 9 F. Limerock shall have an average LBR of not less than 100.

10 **PART 3 - EXECUTION**

11 3.01 GENERAL

- 12 A. The limerock shall be transported to the point where it is to be used, over rock previously
13 placed if practicable, and dumped on the end of the preceding spread. Hauling over the
14 subgrade and dumping on the subgrade will be permitted only when, in the County's
15 opinion, these operations will not be detrimental to the base.

16 3.02 SPREADING LIMEROCK

- 17 A. The limerock shall be spread uniformly. All segregated areas of fine or coarse rock shall
18 be removed and replaced with properly graded rock.
- 19 B. When the specified compacted thickness of the base is greater than 6-inches, the base
20 shall be constructed in 2 courses. The thickness of the first course shall be approximately
21 one-half the total thickness of the finished base, or enough to bear the weight of the
22 construction equipment without disturbing the subgrade.
- 23 C. All operations for constructing limerock base for shoulder construction at any particular
24 location shall be done prior to placing the final course of pavement on the traveled
25 roadway. In the construction of limerock base on the shoulders, the Contractor shall
26 assure that the dumping of the limerock material shall be at such points and in such
27 manner, that no significant material is allowed on the adjacent pavement, to scar or
28 contaminate the pavement surface. Any limerock material which is deposited on the
29 surface course for any reason shall be immediately swept off.

30 3.03 COMPACTING AND FINISHING BASE

- 31 A. For single course base, after the spreading is completed the entire surface shall be
32 scarified and then shaped so as to produce the required grade and cross section after
33 compaction.

- 1 B. For double course base, the first course shall be cleaned of foreign material and bladed
2 and brought to a surface cross section approximately parallel to that of the finished base.
3 Prior to the spreading of any material for the upper course, the density tests for the lower
4 course shall be made and the County shall have determined that the required compaction
5 has been obtained. After the spreading of the material for the second course is
6 completed, its surface shall be finished and shaped so as to produce the required grade
7 and cross section after compaction, and free of scabs or laminations.
- 8 C. When the material does not have the proper moisture content to insure the required
9 density, wetting or drying will be required. When water is added it shall be uniformly
10 mixed in by disking to the full depth of the course which is being compacted. Wetting or
11 drying operations shall involve manipulation, as a unit, of the entire width and depth of
12 the course which is being compacted.
- 13 D. As soon as proper conditions of moisture are attained the material shall be compacted to a
14 density of not less than 98% of maximum density as determined by AASHTO T-180.
15 The minimum density which will be acceptable at any location outside the traveled
16 roadway (such as intersections, crossovers, turnouts, shoulders, etc.) shall be 98% of such
17 maximum.
- 18 E. At least 3 density determinations shall be made on each day's final compaction operations
19 on each course, and the density determinations shall be made at more frequent intervals if
20 deemed necessary by the County. During final compaction operations, if grading of any
21 areas is necessary to obtain the true grade and cross section, the compacting operations
22 for such areas shall be completed prior to making the density tests on the finished base.

23 3.04 CORRECTION OF DEFECTS

- 24 A. If at any time the subgrade material should become mixed with the base course material,
25 the Contractor shall without additional compensation dig out and remove the mixture,
26 reshape and compact the subgrade, and replace the materials removed with clean base
27 material.
- 28 B. If cracks or checks appear in the base, either before or after priming, which in the opinion
29 of the County would impair the structural efficiency of the base, the Contractor shall
30 remove the cracks or checks by re-scarifying, reshaping, adding base material where
31 necessary, and re-compacting.

32 3.05 TESTING SURFACE

- 33 A. The finished surface of the base course shall be checked with a template cut to the
34 required crown and a 15-foot straightedge placed parallel to the center line of the road.
35 Both templates shall be provided by the Contractor. All irregularities greater than 1/4-
36 inch shall be corrected by scarifying and removing or adding limerock as required, after
37 which the entire area shall be re-compacted.

1 3.06 PRIMING AND MAINTAINING

2 A. The prime coat shall be applied when the base meets the specified density requirements
3 and moisture content in the top half of the base does not exceed 90% of the optimum
4 moisture of the base material. At the time of priming, the base shall be firm, unyielding,
5 and in such condition that no undue distortion will occur.

6 B. The Contractor shall be responsible for assuring that the true crown and template are
7 maintained, with no rutting or other distortion, and the base meets all the requirements at
8 the same time the surface course is applied.

9 3.07 THICKNESS REQUIREMENTS

10 A. Thickness of the base shall be measured in intervals of not more than 200-feet.
11 Measurements shall be taken at various points on the cross section, through holes not less
12 than 3-inches in diameter.

13 B. Where the compacted base is deficient by more than 3/8-inches from the thickness called
14 for in the Drawings, the Contractor shall correct such areas by scarifying and adding
15 limerock. The base shall be scarified and limerock added for a distance of 100-feet in
16 each direction from the edge of the deficient area. The affected areas shall then be
17 brought to the required state of compaction and to the required thickness and cross
18 section.
19

20 END OF SECTION

1 1.04 SHOP DRAWINGS AND SUBMITTALS

- 2 A. Submittals shall be submitted to the County for review and acceptance prior to
3 construction in accordance with the General Conditions and specifications Section 01300
4 "Submittals."
5 1. Soil-cement design mix

6 **PART 2 - PRODUCTS**

7 2.01 GENERAL

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

10 2.02 MATERIALS

- 11 A. Cement shall be Portland cement, Type I, II, III, or Type 1-P per FDOT Specification
12 Section 921.
- 13 B. Use water that is free from substances deleterious to hardening of the soil-cement
14 mixture.
- 15 C. Curing Material shall be per FDOT Specification Section 916.
- 16 D. Emulsified asphalt shall be Grade SS, RS, or MS as approved by the County. Dilute as
17 recommended by the manufacturer.
- 18 E. Soils for base course construction shall be either limerock material per FDOT
19 Specification Section 911 or soils meeting the following requirements:
20
21

**Table 02572-1
Soil Requirements**

Physical Characteristic	Acceptance Level	Testing Standard
Organic Material	Maximum 5%	AASHTO T-267
Total Clay and Silt Content (Minus No. 200 Sieve)	Maximum 25%	AASHTO T-88
Plastic Index	Maximum 10%	AASHTO T-90
Liquid Limit	Maximum 25%	AASHTO T-89

22
23

**Table 02572-2
Soil Gradation Requirements**

Soil Gradation Requirements (Per AASHTO T-88)	
Passing 2-inch sieve	Minimum 100%
Passing No. 4 sieve	Minimum 55%
Passing No. 10 sieve	Minimum 37%

1 2.03 PROPORTIONING OF MIX

- 2 A. Submit for approval a design mix for the soil proposed for use in soil-cement
3 construction prepared by a testing laboratory approved by the County. The design mix
4 submittal shall include the results of tests run to verify that the soil meets the
5 requirements; results of tests used to establish the cement content; and a final design
6 laboratory sample. Submit the design mix to the County for approval a minimum of 60-
7 calendar days prior to beginning of soil-cement construction for Brush Loss Design
8 Method or 15-calendar days prior to beginning of soil-cement construction for Strength
9 Design Method. Express the cement as a percentage of the dry unit weight of the soil.
10 For mixed-in-place construction, use a ratio of cement based on the maximum density of
11 the soil determined in accordance with AASHTO T-99 and rounded up to the nearest
12 pound per cubic yard.
- 13 B. When proportioning the soil-cement mixture in accordance with strength design,
14 determine the minimum cement content using FM 5-520. The design compressive
15 strength specified shall be achieved in 7-days. Ensure that the cement content is not less
16 than 5% by weight except as noted below.
- 17 C. When proportioning the soil-cement mixture in accordance with Brush Loss Design
18 criteria, determine the minimum cement content in accordance with AASHTO T-135.
19 Ensure that the cement content is not less than 5% by weight except as noted below.
20 Ensure that the soil-cement loss at the completion of 12 cycles of testing conforms to the
21 limits in the following table.
22

**Table 02572-3
Soil Limits**

Soil Group	Limits
AASHTO Soils Groups A-1, A-2-4, A-2-5, and A-3	Not over 14%
AASHTO Soils Groups A-2-6, A-2-7, A-4, and A-5	Not over 10%
AASHTO Soils Groups A-6 and A-7	Not over 7%

1 D. When proportioning of soil-cement mixture by the Brush Loss Design Criteria Method
2 and processing by Central-Plant-Mixing where the requirements noted below are met, the
3 County will not require strength testing of field specimens. Verify the properties of the
4 parent material during the processing, on a random frequency, to ensure that the final mix
5 has not changed from the original design. Provide the County a printout of each day's
6 production that shows proportioning of the mixture meets the approved Brush Loss
7 Design, including cement.

8 E. Do not apply the minimum 5% cement content specified above if obtaining the soil
9 material used in producing a soil-cement mixture from a commercial source (not to
10 exclude recycled materials) where soil properties are consistently uniform, and if
11 processing the mixture in a central mix plant that automatically weighs components and
12 automatically records the weight of each component on a printed ticket, tape, or other
13 digital record.

14 **PART 3 - EXECUTION**

15 3.01 GENERAL

16 A. Use any machine, combination of machines, or equipment that is in good, safe working
17 condition and that will produce results meeting the requirements for cement application,
18 soil pulverization, mixing water application, compaction, finishing, and curing, as
19 required herein. Compaction equipment shall be used that will produce a base at the
20 required density.

21 3.02 SUBGRADE PREPARATION

22 A. Subgrade shall be completed before beginning base construction operations. Ensure that
23 the subgrade is firm enough to support the equipment used in the soil-cement base
24 operations without appreciable distortion or displacement. Remove any unsuitable
25 material and replace it with suitable material.

26 B. When constructing the base with central-plant-mixed soil-cement, grade and shape the
27 subgrade to the lines, grades, and typical cross-section shown in the plans. Ensure that
28 the subgrade is moist but not ponded at the time of placing the mixed base course
29 material.

30 3.03 BASE SOIL FOR MIXED-IN-PLACE PROCESSING

31 A. Grade and shape the area over which the base is to be constructed to an elevation that will
32 provide a base in conformance with the grades, lines, thickness, and typical cross-
33 sections shown on the plans. Remove all roots, sticks, and other deleterious matter
34 during processing.

1 3.04 PROCESSING OF SOIL-CEMENT MIXTURE

- 2 A. Mix the soil, cement, and water either by mixed-in-place or central-plant-mix methods.
- 3 B. Do not allow the percentage of moisture in the soil at the time of cement application to
4 exceed the quantity that will permit a uniform and intimate mixture of soil and cement
5 during mixing operations.
- 6 C. During seasons of freezing temperature, do not spread any cement or soil-cement mixture
7 unless the ambient temperature is at least 40°F in the shade.
- 8 D. At the completion of moist-mixing, pulverize the soil so that 100% passes a 1-1/2-inch
9 sieve, 95 to 100% passes the 1-inch sieve and a minimum of 80% passes a No. 4 sieve,
10 exclusive of gravel, shell, or stone.
- 11 E. Operations shall be completed within a period of 4-hours starting at the time mixing
12 commences.

13 3.05 MIXED-IN-PLACE METHOD

- 14 A. Where feasible, process the entire width of the base in a single operation. Uniformly
15 spread the design quantity of cement on the soil at the required rate of application, by
16 means of an approved method. Replace spread cement that becomes displaced before
17 starting mixing. Check the uniformity of spread rate by:
- 18 1. Weight of cement spread/square yards covered for a short trial section that is between
19 100 and 300-feet in length; or
20 2. Use of a square yard cloth/box
- 21 B. After applying the cement, begin mixing within 60-minutes. Initially mix the soil and
22 cement until the cement has sufficiently blended with the soil to prevent formation of
23 cement balls when applying additional water; then add water if necessary, and re-mix the
24 soil-cement mixture. Do not perform windrow mixing.
- 25 C. Process up to the full depth in 1 course, provided the distribution of cement and water
26 and the specified density are satisfactory to the County. If not, construct courses of such
27 thickness to obtain satisfactory results. Make provisions to achieve adequate bonding
28 between courses.
- 29 D. Immediately after mixing of the soil and cement, add any additional water that is
30 necessary. If the moisture content exceeds that specified, manipulate the soil-cement
31 mixture by re-mixing or grading as required to reduce the moisture content to within the
32 specified range. Avoid excessive concentrations of water. Continue mixing during and
33 after applying water until obtaining a uniform mixture of soil, cement, and water.
- 34 E. As an alternative to the above-described procedure, the Contractor may use an approved
35 machine that will blend the cement and the soil. Additional water may be added and
36 mixed as necessary.

1 3.06 CENTRAL-PLANT-MIXED METHOD

2 A. Mix the soil, cement, and water in a pugmill of either the batch or continuous-flow type.
3 Equip the plant with feeding and metering devices that will accurately proportion the soil,
4 cement, and water in the quantities specified. Mix soil and cement sufficiently to prevent
5 cement balls from forming when adding additional water. Continue mixing until
6 obtaining a uniform mixture of soil, cement, and water.

7 B. Haul the mixture to the roadway in trucks equipped with protective covers. Place the
8 mixture on the moistened subgrade in a uniform layer with suitable equipment. Do not
9 allow more than 60-minutes to elapse between placing of soil-cement in adjacent passes
10 of the spreader at any location, except at construction joints. Ensure that the layer of soil-
11 cement is uniform in thickness and surface contour and in such quantity that the
12 completed base will conform to the required grade and cross-section. Do not perform
13 windrow mixing.

14 3.07 CONSTRUCTION JOINTS

15 A. Prior to joining any previously constructed section of base, form a vertical construction
16 joint by cutting back into the completed work to form a true vertical face of acceptable
17 soil-cement to the full depth of the base course. Moisten the vertical face as needed prior
18 to placing new material against it.

19 3.08 SHAPING AND FINISHING

20 A. Prior to final compaction, shape the surface of the soil-cement to the required lines,
21 grades, and cross-section. In all cases where adding soil-cement mixture to any portion
22 of the surface, lightly scarify the surface with a spring tooth harrow, spike drag, or other
23 approved device to uniformly loosen the surface prior to adding material and prior to the
24 initial set of the soil-cement mixture. Compact the resulting surface to the specified
25 density. Continue rolling until all rutting ceases and until the base conforms to the
26 density requirements.

27 B. Ensure that the surface material is moist but not ponded, and maintained at not less than
28 2% below its specified optimum moisture content, during finishing operations. Perform
29 surface compaction and finishing in such a manner as to produce a smooth dense surface,
30 free of compaction planes, construction cracks, ridges, and loose material.

31 C. If the time limits specified above are exceeded, either remove and replace the base or
32 leave the base undisturbed for a period of 7-days, after which, the County will examine it
33 to determine its suitability. If found unsuitable, remove and replace the base at no
34 additional cost to County.

1 3.09 COMPACTION

2 A. Begin compacting the soil-cement mixture immediately after mixing or placing. Do not
3 allow more than 30-minutes to elapse between the last pass of moist-mixing or spreading
4 and the start of compaction of the soil-cement mixture at a particular location.

5 B. Determine the optimum moisture content and the maximum density in the field by the
6 methods prescribed in AASHTO T-134 on representative samples of the soil-cement
7 mixture obtained immediately after the initial mixing. Determine the density for each
8 day's run or change of material.

9 C. Uniformly compact the loose material to meet the density requirements specified below.
10 During compaction operations, reshape the material to obtain required grade and cross-
11 section.

12 3.10 PROTECTION AGAINST DRYING

13 A. While finishing and correcting the surface, keep the surface of the base continuously
14 moist by sprinkling water as necessary until applying the emulsified asphalt curing
15 material. As soon as practicable, protect the base from drying for 7-days by applying the
16 emulsified asphalt at the rate of 0.20 to 0.25-gallons of the diluted mixture per square
17 yard. Provide complete coverage without excessive runoff. While applying the
18 bituminous material, ensure that the soil-cement surface is dense, free of all loose and
19 extraneous material, and contains sufficient moisture to prevent excessive penetration of
20 the bituminous materials.

21 B. If it is necessary to allow construction equipment or other traffic to use the completed
22 base before the bituminous material has cured sufficiently to prevent pickup or
23 displacement, sand the bituminous material, using approximately 10-lbs of clean sand per
24 square yard. Do not use cover material containing organic acids or other compounds
25 detrimental to the soil-cement base.

26 C. Maintain the curing material during the 7-day protection period.

27 3.11 OPENING TO TRAFFIC

28 A. Do not allow traffic on the base subsequent to completion of the finishing operations for
29 a minimum period of 72-hours. As an exception to this requirement, allow equipment
30 necessary for correction of surface irregularities, application of water, and application of
31 curing materials on the base, if the tire contact pressures of such equipment do not exceed
32 45-psi. Under special conditions (i.e. low speed limit, low traffic volume, urban
33 conditions), the County may waive the 72-hour period.

1 3.12 MAINTENANCE

- 2 A. Maintain the base to a true and satisfactory surface until the wearing surface is
3 constructed. If the County requires any repairing or patching, extend the repair or patch
4 to the full depth of the base, and make them in a manner that will ensure restoration of a
5 uniform base course in accordance with the requirements of these Specifications. Do not
6 repair the base by adding a thin layer of soil-cement or concrete to the completed work.
7 Make full depth repairs to small or minor areas, such as at manholes or inlets, with Class
8 I concrete.
- 9 B. For patching of deficient areas less than 100-square feet and less than 1-inch in depth,
10 correct the areas using Type S-III Asphalt Concrete. For patching of deficient areas less
11 than 100-square feet and greater than 1-inch in depth, remove the areas to full depth and
12 replace them using Asphalt Base Course Type 3, Type S Asphaltic Concrete, or soil-
13 cement.

14 3.13 DENSITY TESTING REQUIREMENTS

- 15 A. As soon as possible after completing compaction, perform field density testing to ensure
16 that the density is 97% of the maximum density as determined by methods prescribed in
17 AASHTO T-134.
- 18 B. If an individual test value within a LOT is less than 94% of the maximum density,
19 determine the extent of this deficiency by performing density tests using a 5-foot grid
20 pattern until a test value of 95% or greater is located in all directions. Remove the
21 delineated area of base, and replace it with base meeting all requirements of this section,
22 at no cost to the County.
- 23 C. As an exception to the foregoing, if 3 or more of the original 5 individual test values
24 within a LOT are less than 94% of the maximum density, the County will reject the entire
25 LOT, and the Contractor shall remove all base within the LOT and replace it with base
26 meeting all requirements of this Section, at no expense to the County.

27 3.14 SURFACE FINISH ACCEPTANCE REQUIREMENTS

- 28 A. After compacting and finishing, and not later than the beginning of the next calendar day
29 after constructing any section of base, measure the surface with a template cut to the
30 required cross-section and a 15-foot straightedge placed parallel to the centerline of the
31 road. Both templates shall be provided by the Contractor. Correct all irregularities
32 greater than 1/4-inch to the satisfaction of the County with a blade adjusted to the lightest
33 cut which will ensure a surface that does not contain depressions greater than 1/4-inch
34 under the template or the straightedge. The County may approve other suitable methods
35 for measurement.

1 3.15 THICKNESS ACCEPTANCE REQUIREMENTS

2 A. Construction tolerances for thickness are as follows:
3

Table 02572-4
Thickness Tolerances

	Allowable Deviation From Plan Thickness
Central-Plant-Mixed Processing	-1-inch
Mixed-in-Place Processing	+/- 1-inch

4 B. When any thickness measurement is outside the construction tolerance, the County will
5 take additional thickness measurements at 10-foot intervals parallel to the centerline in
6 each direction from the measurement which is outside the construction tolerance until a
7 measurement in each direction is within the construction tolerance.

8 C. The County will evaluate an area of base found to have a thickness outside the
9 construction tolerance and may require the Contractor to remove and replace it with
10 acceptable base of the thickness shown in the plans at no expense to the County.

11 3.16 STRENGTH TESTING OF FIELD SPECIMENS

12 A. Check the adequacy of cement content and uniformity of distribution of cement within
13 the base by sampling and testing the completed mix.

14 B. Take samples at the project site just prior to final compaction and perform a minimum of
15 2 Strength Test Values (STV) each day, with at least 1 STV per each 2,500 square yards
16 mixed.

17 C. Ensure that each STV is the average strength value of a minimum of 3 individual
18 specimens.

19 D. Take representative samples of the mixed soil-cement material for determining an STV
20 just prior to final compaction, recording the sample location, and ensuring that the
21 samples are large enough to mold 3 or more compressive strength test specimens as
22 prescribed in FM 5-520.

23 E. Mold test specimens at the field moisture content and cast the individual test specimens
24 as close to identical as possible

25 F. Rest the molds during compaction of strength test specimens on a 200-pound concrete
26 block that the Contractor provides.

27 G. Gently extrude these test specimens from the compaction mold, and carefully place them
28 in a moist curing environment (not in direct contact with water) such as a tightly closed
29 container under wet cloth or burlap at locations where they will not be disturbed.

- 1 H. Continue the initial field cure for at least 24-hours, and if after 24-hours it is determined
2 that the specimens have not gained sufficient strength to be moved without probable
3 damage, continue field curing until the County determines that each specimen can be
4 safely moved without probable damage occurring. When the County determines that the
5 specimens can be safely moved, transport them to the laboratory where they will be
6 cured, as described in the design procedure (FM 5-520), to 7-days of age. At 7-days of
7 age, test the individual specimen for determination of compressive stress and ensure that
8 the loading procedure and rates are the same, as described in FM 5-520.
- 9 I. If an STV is less than 60% of the Laboratory Design Strength, remove and replace the
10 material represented by the STV, at no expense to the County.
- 11 J. When the LOT average thickness of soil-cement base is deficient by more than 1-inch
12 and the judgment of the County is that the area of such deficiency should not be removed
13 and replaced, payment for the area retained will be at 50%.
- 14 K. When multiple deficiencies occur, the applicable percent payment schedule will be
15 applied to the LOT of base that is identified with each deficiency. The penalty for each
16 deficiency will be applied separately to the unit price.
17

18 END OF SECTION

- 1 B. Do not spread the mixture when the wind is blowing to such an extent that proper and
2 adequate compaction cannot be maintained or when sand, dust, etc., are being deposited
3 on the surface being paved to the extent that the bond between layers will be diminished.
- 4 C. Field compaction density and thickness testing frequencies of the asphalt shall be tested
5 once every 300-linear feet of paving per 24-foot wide strip, staggered left, center, and
6 right of centerline. Where less than 300-linear feet of asphalt is placed in 1-day, provide
7 minimum of 1 test for each per day's construction at a location designated by the County.
- 8 D. Asphalt extraction gradation shall be tested from grab samples collected once every
9 1,800-square yards of asphalt delivered to the site, or a minimum of once per day. Obtain
10 the results in a timely manner (no later than the end of the day) so that adjustments can be
11 made if necessary.
- 12 E. On initial use of a Type S mix design at a particular plant, as a minimum, run an
13 additional extraction gradation analysis if more than 500-tons [450-metric tons] of
14 mixture are produced on the first day of production.
- 15 F. Tolerances for Quality Control Tests (Extraction Gradation Analysis) shall be in
16 accordance with FDOT Specification Section 331.

17 1.04 SHOP DRAWINGS AND SUBMITTALS

- 18 A. Submittals shall be submitted to the County for review and acceptance prior to
19 construction in accordance with the General Conditions and specifications Section 01300
20 "Submittals."
- 21 1. Submit for each proposed design mix the Gradation analysis; Grade of asphalt cement
22 used; and Marshall Stability in pounds flow.
- 23 2. Provide a single percentage of asphalt by weight of total mix intended to be
24 incorporated in the completed mixture, shown to the nearest 0.1%. For structural
25 mixes (S-1, S-3) establish the optimum asphalt content at a level corresponding to a
26 minimum of 4.5% air voids. Provide the laboratory density of the asphalt mixture for
27 all mixes except Open-Graded Friction Courses.
- 28 3. Identify source and description of the materials to be used.
- 29 4. Provide certification that the mix design conforms to specification requirements.
- 30 5. Field compaction density and thickness testing.
- 31 6. Field asphalt extraction gradation.

32 **PART 2 - PRODUCTS**

33 2.01 GENERAL

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

- 1 B. Type S Asphalt Concrete (Type S-1 or S-3) is required. The equivalent fine Type SP
 2 (Superpave) Asphalt Concrete mixture (Traffic Level C) meeting the requirements of
 3 FDOT Specification Section 334 may be selected as an alternate at no additional cost to
 4 the County. The equivalent mixes are as follows:
 5 1. Type S-1: Type SP-12.5
 6 2. Type S-3: Type SP-9.5
- 7 C. Asphalt plant and equipment shall meet the requirements in FDOT Specification Section
 8 320.

9 2.02 AGGREGATE

- 10 A. Coarse Aggregate, Stone, Slag, or Crushed Gravel shall meet the requirements in FDOT
 11 Specification Section 901.
- 12 B. Fine Aggregate shall meet the requirements in FDOT Specification Section 902.
- 13 C. Aggregate gradation shall meet the following:
 14
 15

**Table 02573-1
 Bituminous Concrete Mixtures
 (Gradation Design Range)**

Type	Total Aggregate Passing Sieves ¹							
	3/4-inch [19.0 mm]	1/2-inch [12.5 mm]	3/8-inch [9.5 mm]	No. 4 [4.75 mm]	No. 10 [2.0 mm]	No. 40 [425 μm]	No. 80 [180 μm]	No. 200 [75 μm]
S-1 ⁴	100	88-98	75-93	47-75	31-53	19-35	7-21	2-6
S-3 ⁴		100	88-98	60-90	40-70	20-45	10-30	2-6
ABC-1		100						0-12
ABC-2		100			55-90			0-12
ABC-3 ²	70-100			30-70	20-60	10-40		2-10
FC-2 ³		100	85-100	10-40	4-12			
FC-3 ⁴		100	88-98	60-90	40-70	20-45	10-30	2-6
1. In inches [mm] or sieves [μm]. 2. 100% passing 1-1/2-inch [37.5 mm] sieve. 3. The County may increase the design range for the No. 10 [200 mm] sieve for lightweight aggregates. 4. The County may retain up to 1% on the maximum sieve size.								

- 16
- 17 D. Use clean aggregate containing no deleterious substances. Do not use coarse or fine
 18 aggregate which contains more than 0.5% of phosphate.
- 19 E. In laboratory tests, and for the purpose of proportioning the paving mixture, consider all
 20 material passing the No. 10 [2.00-mm] sieve and retained on the No. 200 [75 μm] sieve
 21 as fine aggregate, and the material passing the No. 200 [75 μm] sieve as mineral filler.

1 F. Do not use any screenings in the combination of aggregates containing more than 15% of
 2 material passing the No. 200 [75 µm] sieve. When two screenings are blended to produce
 3 the screening component of the aggregate, one of such screenings may contain up to 18%
 4 of material passing the No. 200 [75 µm] sieve, as long as the combination of the two does
 5 not contain over 15% material passing the No. 200 [75 µm] sieve. Screenings may be
 6 washed to meet these requirements.

7 2.03 ASPHALT CEMENT

8 A. Superpave PG Asphalt Binder or Recycling Agent shall meet the requirements in FDOT
 9 Specification Section 916.

10 B. Mineral Filler shall meet the requirements in FDOT Specification Section 917.

11 C. Marshall design mix shall be in accordance with the following:
 12
 13

**Table 02573-2
 Marshall Design Properties For Bituminous Concrete Mixes**

Mix Type	Minimum Marshall Stability (lbs.)	Flow* (0.01 in)	Minimum VMA (%)	Air Voids (%)	Minimum Effective Asphalt Content (%)	VFA Voids Filled with Asphalt (%)
S-1	1,500	8-13	14.5	4-5	**	65-75
S-3	1,500	8-13	15.5	4-6	**	65-75
ABC-1	500	7-15	15	5-16	6.0	-
ABC-2	750	7-15	15	5-14	5.5	-
ABC-3	1,000	8-13	14	4-7	**	65-78
FC-2	-	-	-	-	-	-
FC-3	1,500	8-13	15.5	4-6	**	65-75

* The maximum Flow value during production shall not exceed one point more than shown in the Table.

** The ratio of the percentage by weight of total aggregate passing the No. 200 sieve to the effective asphalt content expressed as a percentage by weight of total mix shall be in the range of 0.6 to 1.2.

14

15 2.04 BITUMINOUS MIXTURE

16 A. Use a bituminous mixture composed of a combination of aggregate (coarse, fine or
 17 mixtures thereof), mineral filler, if required, and bituminous material. Ensure that no
 18 more than 20% by weight of the total aggregate used is silica sand or local materials as
 19 defined in FDOT Specification Section 902. Size, grade, and combine the several
 20 aggregate fractions in such proportions that the resulting mixture meets the grading and
 21 physical properties of the verified mix design.

1 **PART 3 - EXECUTION**

2 3.01 GENERAL

3 A. Set up, install and maintain temporary traffic control devices and detours as necessary in
4 accordance with Specification Section 01570 "Maintenance of Traffic."

5 B. Asphalt pavements, including all surface courses and base courses, where shown to be
6 open cut and removed on the Drawings or specified in the Project Manual, shall be
7 removed to a line back from each edge of the trench, other excavation, or to the limits
8 indicated on the Drawings. Pavements shall be cut straight, clean and square with a
9 power saw or other tools and equipment suitable for the Work.

10 C. Asphalt pavements, where shown to be milled on the Drawings or specified in the Project
11 Manual, shall be milled according to FDOT Specification Section 327.

12 D. Asphalt mixtures shall meet the general construction requirements specified in FDOT
13 Specification Section 330.

14 E. Spread the mixture only when the surface upon which it is to be laid has been previously
15 prepared, is intact, firm, and properly cured, and is dry. Do not spread mixture that
16 cannot be finished and compacted during daylight hours.

17 F. Deliver the asphalt cement from the asphalt plant at a temperature not to exceed 350°F
18 and equip the transport tanks with sampling and temperature sensing devices meeting the
19 requirements of FDOT. Maintain the asphalt cement in storage within a range of 230°F
20 to 350°F in advance of mixing operations. Maintain constant heating within these limits,
21 and do not allow wide fluctuations of temperature during a day's production.

22 G. Produce a homogeneous mixture, free from moisture and with no segregated materials,
23 that meets all specification requirements for the mixture, including compliance with the
24 Marshall Properties. Also apply these requirements to all mixes produced by the drum
25 mixer process and all mixes processed through a hot storage or surge bin, both before and
26 after storage.

27 3.02 PREPARATION OF APPLICATION SURFACES

28 A. Prior to the laying of the mixture, clean the surface of the base or pavement to be covered
29 of all loose and deleterious material by the use of power brooms or blowers,
30 supplemented by hand brooming where necessary.

31 B. Where an asphalt mix is to be placed on an existing pavement or old base that is irregular,
32 and wherever the plans indicate, bring the existing surface to proper grade and cross-
33 section by the application of patching or leveling courses.

34 C. Where an asphalt mix is to be placed over a newly constructed surface treatment, sweep
35 and dispose of all loose material from the paving area.

- 1 D. Paint all structures which will be in actual contact with the asphalt mixture, with the
2 exception of the vertical faces of existing pavements and curbs or curb and gutter, with a
3 uniform coating of asphalt cement to provide a closely bonded, watertight joint.
- 4 E. Apply a prime and tack coat on newly constructed bases and apply a tack coat, as
5 specified in FDOT Specification Section 300, on existing pavement structures that are to
6 be overlaid with an asphalt mix and between successive layers of all asphalt mixes.

7 3.03 PLACING MIXTURE

- 8 A. Lay all asphaltic concrete mixtures, including leveling courses, other than adjacent to
9 curb and gutter or other true edges, by the string line method to obtain an accurate,
10 uniform alignment of the pavement edge.
- 11 B. For each paving machine operated, use a separate crew, each crew operating as a full
12 unit. The Contractor's Certified Paving Technician in charge of the paving operations
13 may be responsible for more than one crew but must be physically accessible to the
14 County at all times when placing mix.
- 15 C. Check the depth of each layer at frequent intervals, and make adjustments when the
16 thickness exceeds the allowable tolerance. When making an adjustment, allow the
17 paving machine to travel a minimum distance of 32-feet to stabilize before the second
18 check is made to determine the effects of the adjustment.
- 19 D. In limited areas where the use of the spreader is impossible or impracticable, the
20 Contractor may spread and finish the mixture by hand.
- 21 E. Straightedge and back-patch after obtaining initial compaction and while the material is
22 still hot.
- 23 F. Upon arrival, dump the mixture in the approved mechanical spreader, and immediately
24 spread and strike-off the mixture to the full width required, and to such loose depth for
25 each course that, when the Work is completed, the required weight of mixture per square
26 yard [square meter], or the specified thickness, is secured. Carry an excess amount of
27 mixture ahead of the screed at all times. Hand-rake behind the machine as required.
- 28 G. Construct each course in layers of the thickness as shown on FDOT Design Standards
29 Index No. 513.
- 30 H. Before starting any rolling, check the surface; correct any irregularities; remove all
31 drippings, fat sandy accumulations from the screed, and fat spots from any source; and
32 replace them with satisfactory material. Do not skin patch. When correcting a
33 depression while the mixture is hot, scarify the surface and add fresh mixture.

1 3.04 APPLICATION OF LEVELING COURSES

2 A. Before spreading any leveling course, fill all depressions in the existing surface more
3 than 1-inch deep by spot patching with leveling course mixture, and then compact them
4 thoroughly.

5 B. Place all courses of leveling by the use of two (2) motor graders; equip one with a
6 spreader box. Use other types of leveling devices after they have been approved by the
7 County.

8 C. When the total asphalt mix provided for leveling exceeds 50-lb/yds² [27-kg/m²], place the
9 mix in two or more layers, with the average spread of any layer not to exceed 50-lb/yd²
10 [27-kg/m²]. When using Type S-3 Asphaltic Concrete for leveling, do not allow the
11 average spread of a layer to be less than 50-lb/yd² [27-kg/m²] or more than 75-lb/yd² [40-
12 kg/m²]. The Contractor may vary the rate of application throughout the Project as
13 directed by the County. When leveling in connection with base widening, the County
14 may require placing all the leveling mix prior to the widening operation.

15 3.05 COMPACTING MIXTURE

16 A. The coverage is the number of times the roller passes over a given area of pavement.
17 Regardless of the rolling procedure used, complete the final rolling before the surface
18 temperature of the pavement drops below 160°F.

19 B. Seal Rolling: Provide two (2) coverages with a tandem steel-wheeled roller (either
20 vibratory or static), weighing 5 to 12-tons, following as close behind the spreader as
21 possible without pick-up, undue displacement, or blistering of the material. Use
22 vibratory rollers in the static mode for layers of 1-inch or less in thickness.

23 C. Intermediate Rolling: Provide five (5) coverages with a self-propelled pneumatic-tired
24 roller, following as close behind the seal rolling operation as the mix will permit.

25 D. Final Rolling: Provide one (1) coverage with a tandem steel-wheeled roller (static mode
26 only), weighing 5 to 12-tons, after completing the seal rolling and intermediate rolling,
27 but before the surface pavement temperature drops below 160°F.

28 E. Operate the self-propelled, pneumatic-tired roller at a speed of 6 to 10-mph. For each
29 roller, do not exceed an area of coverage of 4,000 yd²/hour; if rolling Type S Asphaltic
30 Concrete, do not exceed an area of coverage of 3,000 yd²/hour.

31 F. Use a sufficient number of self-propelled pneumatic-tired rollers to ensure that the rolling
32 of the surface for the required number of passes does not delay any other phase of the
33 laying operation and does not result in excessive cooling of the mixture before
34 completing the rolling. In the event that the rolling falls behind, discontinue the laying
35 operation until the rolling operations are sufficiently caught up.

- 1 G. Use hand tamps or other satisfactory means to compact areas which are inaccessible to a
2 roller, such as areas adjacent to curbs, headers, gutters, manholes, etc.
- 3 H. Use self-propelled pneumatic-tired rollers to roll all patching and leveling courses.
4 Where placing the initial leveling course over broken concrete pavement, use a
5 pneumatic-tired roller that weighs at least 15-tons. For Type S-3 Asphaltic Concrete
6 leveling courses, use a steel-wheeled roller to supplement the traffic rollers. On other
7 leveling courses, use a steel-wheeled roller to supplement the traffic rollers on all passes
8 after the first pass.
- 9 I. Do not allow the rollers to deposit gasoline, oil, or grease onto the pavement. Remove
10 and replace any areas damaged by such deposits as directed by the County. While rolling
11 is in progress, test the surface continuously, and correct all discrepancies to comply with
12 the surface requirements. Remove and replace all drippings, fat or lean areas, and
13 defective construction of any description. Remedy depressions that develop before
14 completing the rolling by loosening the mixture and adding new mixture to bring the
15 depressions to a true surface. Should any depression remain after obtaining the final
16 compaction, remove the full depth of the mixture, and replace it with sufficient new
17 mixture to form a true and even surface. Correct all high spots, high joints, and
18 honeycombing as directed by the County. Remove and replace any mixture remaining
19 unbonded after rolling. Correct all defects prior to laying the subsequent course.
- 20 J. Use a self-propelled pneumatic-tired roller on the first structural layer placed on a milled
21 surface. Compact with a minimum of three passes.

22 3.06 JOINTS

- 23 A. Place the mixture as continuously as possible. Do not pass the roller over the unprotected
24 end of the freshly laid mixture except when discontinuing the laying operation long
25 enough to permit the mixture to become chilled. When thus interrupting the laying
26 operation, construct a transverse joint by cutting back on the previous run to expose the
27 full depth of the mat.
- 28 B. For all layers of pavement except the leveling course, place each layer so that
29 longitudinal construction joints are offset 6-inches to 12-inches laterally between
30 successive layers.
- 31 C. When laying fresh mixture against the exposed edges of joints (trimmed or formed as
32 provided above), place it in close contact with the exposed edge to produce an even, well-
33 compacted joint after rolling.

34 3.07 SURFACE REQUIREMENTS

- 35 A. Obtain a smooth surface on all pavement courses placed, and then straightedge all
36 intermediate and final courses with a 15-foot rolling straightedge. Furnish a 15-foot
37 [4.572-m] manual straightedge, and make it available at the job site at all times during the
38 paving operation for checking joints and surface irregularities.

- 1 B. Produce a finished surface of uniform texture and compaction with no pulled, torn, or
2 loosened portions and free of segregation, sand streaks, sand spots, or ripples.

3 3.08 ACCEPTANCE REQUIREMENTS

- 4 A. Upon completion of the final surface or friction course, the County will test the finished
5 surface with a 15-foot rolling straightedge. Correct all deficiencies in excess of 3/16-
6 inch.

- 7 B. If correction is made by removing and replacing the pavement, remove the full depth of
8 the course and extend at least 50-feet on either side of the defective area for the full width
9 of the paving lane.

- 10 C. If correction is made by overlaying, cover the length of the defective area and taper
11 uniformly to a featheredge thickness at a minimum distance of 50-feet on either side of
12 the defective area. Extend the overlay the full width of the roadway. Maintain the
13 specified cross slope. The County may adjust, as necessary, the mix used for the overlay
14 for this purpose.

- 15 D. The maximum deficiency from the specified thickness as follows:
16 1. For pavement of a specified thickness of 2-1/2-inches or more: 1/2-inch
17 2. For pavement of a specified thickness less than 2-1/2-inches: 1/4-inch

- 18 E. Where the deficiency in thickness is: (1) in excess of 3/8-inch for pavement of less than
19 2-1/2-inches in specified thickness, or (2) in excess of 3/4-inch for pavement of specified
20 thickness of 2-1/2-inches or more, correct the deficiency either by replacing the full
21 thickness for a length extending at least 50-feet from each end of the deficient area.

- 22 F. For any case of excess deficiency of the pavement, if approved by the County for each
23 particular location, correct the deficient thickness by adding new surface material, and
24 compact it to the same density as the adjacent surface. The County will determine the
25 area to be corrected and the thickness of new material added.

26 3.09 REPAIR AND RESTORATION

- 27 A. Replace asphalt pavement or roadway surfaces cut or damaged to equal or better
28 condition than the original, including stabilization, base course, surface course, curb and
29 gutter, and other appurtenances.

30 3.10 SIGNALIZATION, PAVEMENT STRIPING AND MARKING

- 31 A. The Contractor shall be responsible for coordinating, repairing or replacing all traffic
32 signalization devices and traffic loops damaged during the pavement milling, removal
33 and replacement process.

- 1 B. The Contractor shall be responsible for coordinating, inventorying, and replacing all
2 temporary and permanent pavement striping and markings damaged during the asphalt
3 pavement milling, removal, and replacement process.
- 4 C. Temporary pavement striping and markings shall be paint or reinforced retro-reflective
5 removal tape. Foil back tape is not acceptable. Permanent pavement striping and
6 markings shall be alkyd thermoplastic tape and raised reflective pavement markers.
7

8 END OF SECTION

1 **SECTION 02576**

2 **CONCRETE SIDEWALKS AND DRIVEWAYS**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

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

7 1.02 QUALITY ASSURANCE

- 8 A. Codes and Standards: Comply with applicable sections of F.D.O.T. Specifications and
9 local governing regulations.

- 10 B. The mixture, placement, and curing of all concrete work shall be in accordance with
11 F.D.O.T. Specifications.

12 1.03 SHOP DRAWINGS AND SUBMITTALS

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

- 16 B. Furnish manufacturer's product data, design mixes, test reports, and materials
17 certifications.

18 1.04 JOB CONDITIONS

- 19 A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other
20 construction activities, as specified under Section 01570 "Maintenance of Traffic."

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

22 1.05 GUARANTEE

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

1 **PART 2 - PRODUCTS**

2 2.01 GENERAL

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

5 2.02 CONCRETE MATERIALS

6 A. Forms: Steel or wood for each type of use of size and strength to resist movement during
7 concrete placement and to retain horizontal and vertical alignment until removal. Use
8 straight forms, free of distortion and defects.

9 1. Use flexible spring steel forms or laminated boards to form radius bends as required.

10 2. Coat forms with a non-staining form release agent that will not discolor or deface the
11 surface of the concrete.

12 B. Fibermesh Reinforcement: Fibermesh reinforcement fibers shall be 2-inches to 3-inches
13 collated polypropylene fibers. Fibers shall be in strict accordance with the manufacturer
14 recommendations and within the time as specified in ASTM C94, Type III 4.13 and
15 applicable building codes.

16 C. Concrete Materials: Comply with requirements of F.D.O.T. Section 347 for concrete
17 materials, admixtures, bonding materials, curing materials, and others as required.

18 D. Epoxy Resin Grout: Type N as specified in F.D.O.T. Section 926.

19 E. Aggregate, brick, or other material required to match existing driveway or walk shall be
20 as approved by the County.

21 2.03 CONCRETE MIX, DESIGN, AND TESTING

22 A. Comply with requirements of applicable F.D.O.T. Section 347 for concrete mix design,
23 sampling and testing, and quality control, and as herein specified.

24 B. Design the mix to produce standard weight concrete consisting of Portland cement,
25 aggregate, air entraining admixture, and water to produce the following properties.

26 1. Compressive Strength: Class B, 3,000 psi for walks and curbs.

27 2. Compressive Strength: Class A, 4,000 psi for driveways.

28 3. Air Content: 3% to 6% .

29 C. Concrete slump shall not exceed plus or minus 1-inch from approved design slump.

1 **PART 3 - EXECUTION**

2 3.01 CONCRETE SIDEWALK, DRIVEWAY, AND CURB AND GUTTER

3 A. Surface Preparation:

- 4 1. Remove loose material from the compacted sub base surface immediately before
5 placing concrete.
6 2. Proof-roll prepared sub base surface to check for unstable areas and the need for
7 additional compaction. Do not begin paving work until such conditions have been
8 corrected and are ready to receive paving.

9 B. Form Construction:

- 10 1. Set forms to the required grades and lines, rigidly braced and secured. Install
11 sufficient quantity of forms to allow continuous progress of the Work and so that
12 forms can remain in place at least 24-hours after concrete placement.
13 2. Check completed form work for grade alignment to the following tolerances:
14 a. Top of forms not more than 1/8-inch in 10-feet.
15 b. Vertical face on longitudinal axis, not more than 1/4-inch in 10-feet.
16 3. Clean forms for reuse immediately after use, and coat with form release agent as
17 often as required to ensure separation from concrete without damage.

18 C. Concrete Placement:

- 19 1. Do not place concrete until sub base and forms have been checked for line and grade.
20 Moisten if required to provide a uniform dampened condition at the time concrete is
21 placed. Do not place concrete around manholes or other structures until they are
22 completed to required finish elevation and alignment. Use special colors or aggregate
23 as required to match existing material.
24 2. Place concrete using methods which prevent segregation of the mix. Consolidate
25 concrete along the face of forms and adjacent to transverse joints with an internal
26 vibrator. Keep vibrator away from joint assemblies, reinforcement, or side forms.
27 Use only square-faced shovels for hand spreading and consolidation. Consolidate
28 with care to prevent dislocation of reinforcing, dowels, and joint devices. Do not use
29 vibrators to push or move concrete in forms or chute.
30 3. Deposit and spread concrete in a continuous operation between transverse joints, as
31 far as possible. If interrupted for more than 1/2-hour, place a construction joint.
32 4. An automatic machine may be used for sidewalk or curb and gutter placement at
33 Contractor's option. If machine placement is to be used, submit revised mix design
34 and laboratory test results which meet or exceed the minimum herein specified.
35 Machine placement must produce sidewalks and/or curbs and gutters to the required
36 cross-section, lines, grades, finish, and jointing as specified for formed concrete. If
37 results are not acceptable, remove and replace with formed concrete as specified.

- 1 5. Joints: Construct expansion, weakened-plane (contraction), and construction joints
2 true-to-line with face perpendicular to surface of the concrete, unless otherwise
3 indicated. Construct transverse joints at right angles to the centerline, unless
4 otherwise indicated. When joining existing structures place transverse joints to align
5 with previously placed joints, unless otherwise indicated.
6 a. Weakened-Plane Joints: Provide weakened-plane (contraction) joints sectioning
7 concrete into areas as shown on the Drawings. Construct weakened plane joints
8 for a depth equal to at least 1/4 concrete thickness, by sawing within 24-hours of
9 placement or formed during finishing operations. Place joints at intervals not to
10 exceed 10-feet if not otherwise indicated.
11 b. Construction Joints: Place construction joints at the end of all pours and at
12 locations where placement operations are stopped for a period of more than 1/2-
13 hour, except where such pours terminate at expansion joints. Construction joints
14 shall be as shown or, if not shown, use standard metal keyway-section form of
15 appropriate height.
16 c. Expansion Joints:
17 (1) Provide premolded joint filler for expansion joints abutting concrete curbs,
18 catch basin, manholes, inlets, structures, walks, and other fixed objects, unless
19 otherwise indicated.
20 (2) Locate expansion joints at 12-feet on center for concrete walks unless
21 otherwise indicated.
22 (3) Extend joint fillers full-width and depth of joint, and not less than 1/2-inch
23 below finished surface where joint sealer is indicated. If no joint sealer, place
24 top of joint filler flush with finished concrete surface.
25 (4) Furnish joint fillers in one-piece lengths for the full width being placed,
26 wherever possible. Where more than one length is required, lace or clip joint
27 filler sections together. Pieces shorter than 4-inches shall not be used unless
28 specifically shown as such.
29 (5) Protect the top edge of the joint filler during concrete placement with a metal
30 cap or other temporary material. Remove protection after concrete has been
31 placed on both sides of joint.
32 (6) Fillers and Sealants: Comply with the requirements of these specifications for
33 preparation of joints, materials installation, and performance, and as herein
34 specified.

35 D. Concrete Finishing:

- 36 1. After striking-off and consolidating concrete, smooth the surface by screening and
37 floating. Use hand methods only where mechanical floating is not possible. Adjust
38 the floating to compact the surface and produce a uniform texture.
39 2. After floating, test surface for trueness with a 20-foot straightedge. Variations
40 exceeding 1/3-inch for any two points within 10-feet shall not be acceptable.
41 Distribute concrete as required to remove surface irregularities, and refloat repaired
42 areas to provide a continuous smooth finish.
43 3. Work edges of slabs, gutters, back top edge of curb, and formed joints with an edging
44 tool, and round 10-1/2-inch radius, unless otherwise indicated. Eliminate any tool
45 marks on concrete surface.

- 1 4. After completion of floating and when excess moisture or surface sheen has
2 disappeared, broom finish sidewalks by drawing a fine-hair broom across concrete
3 surface, perpendicular to a line of pedestrian traffic. If the existing material has
4 another finish, match existing finish.
5 5. Do not remove forms for 24-hours after concrete has been placed. After form
6 removal, clean ends of joints and point up any minor honeycombed areas.

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

- 11 F. Repairs and Protections:
12 1. Repair or replace broken or defective concrete, as directed by the County.
13 2. Drill test cores where directed by the County, when necessary to determine
14 magnitude of cracks or defective areas. Fill drilled core holes in satisfactory
15 pavement areas with Portland cement concrete bonded to pavement with epoxy resin
16 grout.
17 3. Protect concrete from damage until acceptance of work. When construction traffic is
18 permitted, maintain pavement as clean as possible by removing surface stains and
19 spillage of materials as they occur.
20 4. Sweep concrete pavement and wash free of stains and discolorations, dirt, and other
21 foreign material just prior to final inspection.

22 3.02 FIELD QUALITY CONTROL

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

30 END OF SECTION

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1 C. It shall be reasonably free of weeds and other grasses and shall have a soil mat of
2 sufficient thickness adhering firmly to the roots to withstand all necessary handling. The
3 sod shall be planted as soon as possible after being dug and shall be shaded and kept
4 moist until it is planted.

5 2.03 FERTILIZER

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

7 B. The numerical designations for fertilizer indicate the minimum percentages (respectively)
8 of (1) total nitrogen, (2) available phosphoric acid, and (3) water-soluble potash
9 contained in the fertilizer.

10 C. The chemical designation of the fertilizer shall be 6-6-6. At least 50% of the nitrogen
11 shall be derived from organic sources. At least 50 % of the phosphoric acid shall be from
12 normal super phosphate or an equivalent source, which will provide a minimum of two
13 units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card
14 attached to each bag or other container.

15 2.04 WATER FOR GRASSING

16 A. The water used in the sodding operations shall be by the Contractor as approved by the
17 County.

18 **PART 3 - EXECUTION**

19 3.01 PREPARATION OF GROUND

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

23 3.02 APPLICATION OF FERTILIZER

24 A. Before applying fertilizer, the soil pH shall be brought to a range of 6.0 - 7.0.

25 B. The fertilizer shall be spread uniformly over the area to be sodded at the rate of 700-
26 pounds per acre, or 16-pounds per 1,000 square feet, by a spreading device capable of
27 uniformly distributing the material at the specified rate. Immediately after spreading, the
28 fertilizer shall be mixed with the soil to a depth of approximately 4-inches.

29 C. On steep slopes, where the use of a machine for spreading or mixing is not practicable,
30 the fertilizer shall be spread by hand and raked in and thoroughly mixed with the soil to a
31 depth of approximately 2-inches.

1 3.03 PLACING SOD

- 2 A. The sod shall be placed on the prepared surface, with edges in close contact and shall be
3 firmly and smoothly embedded by light tamping with appropriate tools.
- 4 B. Where sodding is used in drainage ditches, or on slopes of 4:1 or greater, the setting of
5 the pieces shall be staggered to avoid a continuous seam along the line of flow. Along
6 the edges of such staggered areas, the offsets of individual strips shall not exceed 6-
7 inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer
8 pieces of sod shall be tamped so as to produce a featheredge effect.
- 9 C. On slopes greater than 2:1, the Contractor shall, if necessary, prevent the sod from sliding
10 by means of wooden pegs driven through the sod blocks into firm earth at suitable
11 intervals.
- 12 D. Sod which has been cut for more than 72-hours shall not be used unless specifically
13 authorized by the County after the inspection thereof. Sod which is not planted within
14 24-hours after cutting shall be stacked in an approved manner, maintained, and properly
15 moistened. Any pieces of sod that, after placing, show an appearance of extreme dryness
16 shall be removed and replaced by fresh, uninjured pieces.
- 17 E. Sodding shall not be performed when weather and soil conditions are, in the County's
18 opinion, unsuitable for proper results.

19 3.04 WATERING

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

25 3.05 MAINTENANCE

- 26 A. The Contractor shall maintain, at his expense, the sodded areas in a satisfactory condition
27 until final acceptance of the Project. Such maintenance shall include repairing of any
28 damaged areas and replacing areas in which the establishment of the grass stand does not
29 appear to be developing satisfactorily.
- 30 B. Replanting or repair necessary due to the Contractor's negligence, carelessness, or failure
31 to provide routine maintenance shall be at the Contractor's expense.
32

33 END OF SECTION

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1 1.03 SHOP DRAWINGS AND SUBMITTALS

- 2 A. Submittals shall be submitted to the County for review and acceptance prior to
3 construction in accordance with the General Conditions and specifications Section 01300
4 "Submittals."
5 1. Mill test certificates or certified test reports on pipe
6 2. Details of restrained and flexible joints
7 3. Detailed laying schedule for pipe
8 4. Valves and valve boxes

9 1.04 JOB CONDITIONS

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

24 **PART 2 - PRODUCTS**

25 2.01 GENERAL

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

28 2.02 MATERIALS

- 29 A. Pipe, Fittings, Valves, and Ancillary Equipment shall be installed as shown on the
30 Drawings and as specified in Division 15.
31 B. Additional Work: Additional items of construction, necessary for the complete
32 installation of the systems, shall conform to specific details shown on the Drawings and
33 shall be constructed of first-class materials conforming to the applicable portions of these
34 specifications.

1 **PART 3 - EXECUTION**

2 3.01 PREPARATION

3 A. Bedding:

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

15 3.02 INSTALLATION

16 A. Pipe Identification/Location

- 17 1. All PVC water mains shall be solid blue. All lettering shall appear legibly on the pipe
18 and shall run the entire length of the pipe. Lettering shall read as is acceptable for the
19 intended use.
- 20 2. All ductile iron water mains shall be color coded blue with tape. The tape (minimum 2-
21 inches) shall be permanently affixed to the top and each side of the pipe (3 locations
22 parallel to the axis of the pipe). For pipes less than 24-inches in diameter, a single tape
23 may be used along the top of the pipe.
- 24 3. All HDPE water mains shall be a solid blue or black with 4 co-extruded equally spaced
25 blue stripes of the same material as the pipe. Stripes painted on the pipe outside surface
26 shall not be acceptable.
- 27 4. If main is located over 30-feet from the edge of the pavement or in an easement, the
28 Contractor shall install 4-inch diameter schedule 80 PVC utility pipe line markers
29 over the pipe alignment at 1,000-foot intervals, at all valves, and at all locations where
30 fittings deflect the pipe alignment in the horizontal plane. Utility pipeline markers
31 shall include a decal and shall be colored blue for water service.
- 32 5. All mains (PVC, HDPE, and DI) shall be installed with a continuous, insulated 10-
33 gauge copper wire installed directly above the pipe for location purposes. Locate wire
34 shall terminate in a test station box and be capable of extending 12-inches above the top
35 of the box. Directionally drilled pipe shall be installed with 2 insulated 10-gauge
36 copper wires.

- 1 B. Pipe: The color stripe and pipe text shall be located on the top of the pipe when installed.
2 When installing PVC pipe, no additional joints will be installed until the preceding pipe
3 joint has been completed and the pipe carefully embedded and secured in place.
- 4 1. Gradient: Pipe shall be laid straight and depth of cover shall vary to provide uniform
5 gradient or slope to pipe, whether grading is completed or proposed at time of pipe
6 installation. When a grade or slope is shown on the Drawings, batter boards with
7 string line paralleling design grade, or other previously approved means, shall be used
8 by the Contractor to assure conformance to required grade.
 - 9 2. Pipe Joint Deflection
 - 10 a. Ductile Iron Pipe: Whenever it is desirable to deflect pipe, the amount of deflection
11 shall not exceed 75% of the maximum limits as shown in AWWA Standard C600
12 for ductile iron pipe.
 - 13 b. PVC Pipe: Joint deflection or pipe bending shall not be permitted. The maximum
14 allowable tolerance in the joint due to variances in installation is 0.75° (degrees)
15 (3-inches per joint per 20-foot stick of pipe). No bending tolerance in the pipe
16 barrel shall be acceptable. Alignment change shall be made only with sleeves and
17 fittings.
 - 18 3. Rejects: Any pipe found defective shall be immediately removed and replaced with
19 sound pipe at the Contractor's expense.
 - 20 4. Joint Compounds: No sulfur base joint compound shall be used.
 - 21 5. Thrust restraints shall be accomplished by the use of mechanical restraining devices
22 unless specifically identified otherwise on the Drawings or herein. Restraining
23 devices shall be specified in Sections 15062 "Ductile Iron Pipe and Fittings" and
24 15064 "Polyvinyl Chlorine (PVC) Pipe and Fittings", respectfully.
- 25 C. Installing Valves and Boxes
- 26 1. Valves: Valves shall be carefully inspected, fully opened, and then tightly closed and
27 the various nuts and bolts shall be tested for tightness. Any valve that does not
28 operate correctly shall be removed and replaced.
 - 29 2. Valve Boxes: Valve boxes shall be carefully centered over the operating nuts of the
30 valves so as to permit a valve key to be fitted easily to the operating nut. In unpaved
31 areas, valve boxes shall be set to conform to the level of the finished surface and held
32 in position by a concrete collar placed under the support flange as shown on the
33 Drawings. The letter "V" shall be etched in the curb at each valve location. The
34 valve box shall not transmit surface loads to the pipe or valve but be supported by
35 bedding rock as shown on the Drawings. Extensions or risers for valve boxes shall be
36 an integral part of the box. No cut sections of D.I. or PVC pipe shall be used in
37 extending the box to its proper height. Care shall be taken to prevent earth and other
38 material from entering the valve box. Any valve box which is out of alignment or
39 whose top does not conform to the finished ground surface shall be dug out and reset.
40 Before final acceptance of the Work all valve boxes shall be adjusted to finish grade.
 - 41 3. Concrete Collar: Each valve installed in an unimproved area (outside of pavement,
42 driveways or sidewalks) shall require a 24-inch by 24-inch by 6-inch concrete pad or
43 collar as shown in the Drawings.

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

10 D. Concrete Encasement

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

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

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

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

26 3.03 CLEANING

27 A. General: At the conclusion of the Work, the Contractor shall thoroughly clean the new
28 pipelines by flushing with water or other means to remove all dirt, stones, or other
29 material which may have entered the line during the construction period. Flushing is
30 permitted for pipes less than or equal to 12-inch diameter.

31 B. Correction of Non-Conforming Work: All non-conforming work shall be repaired or
32 replaced by the Contractor at no additional expense to the County. Non-conforming
33 work shall be defined as failure to adhere to any specific or implied directive of this
34 Project Manual and/or the Drawings, including but not limited to pipe not laid straight,
35 true to the lines and grades as shown on the Drawings, damaged or unacceptable
36 materials, misalignment or diameter ring deflection in pipe due to bedding or backfilling,
37 visible or detectable leakage, or failure to pass any specified test or inspection.

1 3.04 FIELD QUALITY CONTROL

2 A. Flushing

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

23 B. Pressure and Leakage Tests of Pressure Piping

- 24 1. General: The Contractor shall perform hydrostatic pressure and leakage tests on all
25 pressure piping. Tests shall be made between valves and shall not exceed 2,000-feet.
26 Each side of all valves shall be pressure tested. Multiple sections of main may be
27 tested simultaneously providing there are non-pressurized sections in between each
28 pressure-tested section.
- 29 2. Standard: AWWA C600, Section 4, with the exceptions required herein and the
30 exception that the Contractor shall furnish all gauges, meters, pressure pumps, and
31 other equipment needed to test the lines.
- 32 3. Hydrostatic Pressure Test
- 33 a. Test Pressure: Pressure test at 50% above the normal working pressure, but not
34 less than 150-psi, unless otherwise noted on the Drawings.
35 b. Test Duration: Duration is 2-hours. If during the test, the integrity of the tested
36 line is in question, the County may require a 6-hour pressure test.
37 c. Air Release: Corporation cocks at least 3/4-inch in diameter, pipe riser, and angle
38 globe valves shall be provided at each dead-end to bleed air from the line.
- 39 4. Hydrostatic Leakage Test
- 40 a. General: Following the pressure test, the Contractor shall perform the leakage test.
41 The line shall be filled with water and all air removed for the test. The Contractor
42 shall provide a pump to maintain the test pressure for the entire test period.
43 b. Test Pressure: Maximum operating pressure as determined by the County but not
44 less than 150-psi unless otherwise noted.
45 c. Test duration: 2-hours.

1 B. In the event the proposed main is to be connected to a main which has one or more active
2 services between the point of connection and the first existing line valve, a temporary
3 plug or cap shall be installed on the new main until the pressure tests and disinfecting are
4 completed. Upon satisfactory completion, the cap or plug shall be removed from both
5 mains and the connection made with pipe which has been swabbed out with a solution of
6 chlorine and water. The connection shall be made as swiftly as possible and any water in
7 the ditch shall be kept below the level of the pipe. The pipeline shall then be placed in
8 service by the County's personnel.

9 C. In the event any existing users will be without water while a connection is being made,
10 the Contractor shall notify the County 72-hours prior to disconnection. The County shall
11 notify the affected user(s) when the water will be turned off and when the service is
12 estimated to be resumed. In some instances, these connections may have to be made at
13 night. No user shall be without water service for more than 3-hours.

14 3.07 SUPPLIER'S FIELD SERVICE:

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

20 3.08 WATER FOR USE IN FLUSHING, TESTING, AND DISINFECTION:

21 A. The Contractor shall arrange with the County for water required for pressure testing,
22 flushing, and disinfection required by the Contractor. The Contractor shall provide meter
23 and backflow preventer.
24

25 END OF SECTION

1 **SECTION 03100**
2 **CONCRETE FORMWORK**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. Scope of Work: This Section specifies all labor, materials and equipment necessary for
6 providing and installing formwork for concrete.

7 B. Related Work Described Elsewhere:

8 1. Section 03200 "Concrete Reinforcement"

9 2. Section 03300 "Cast-in-Place Concrete"

10 C. General Design: The Contractor shall be responsible for the design of all formwork and
11 for safety in its construction, use and removal.

12 1.02 QUALITY ASSURANCE

13 A. Qualifications: Formwork shall be constructed in accordance with the specified standards, as
14 well as all pertinent codes and regulations. In cases where requirements of pertinent codes
15 conflict with the requirements of these specifications, the more stringent shall govern.

16 B. Standards: Unless otherwise indicated, all materials, workmanship and practices shall
17 conform to the following standards:

18 1. Standard Building Code

19 2. ACI 347 "Recommended Practice for Concrete Formwork"

20 3. Local codes and regulations

21 1.03 SHOP DRAWINGS AND SUBMITTALS

22 A. Submittals shall be submitted to the County/Professional for review and acceptance prior
23 to construction in accordance with the General Conditions and specifications Section
24 01300 "Submittals."

25 B. Materials: Submit manufacturer's literature on form ties, spreaders, corner formers, form
26 coatings and bond breakers.

27 **PART 2 - PRODUCTS**

28 2.01 GENERAL

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

1 2.02 MATERIALS

2 A. Form Lumber: Use form lumber when in contact with exposed concrete, conforming to
3 the following or acceptable equivalent.

4 B. Lumber: Douglas Fir/Larch No. 2 grade, seasoned, surfaced on four sides.

5 C. Plywood: "Plyform", Class I or II, bearing the label of the Douglas Plywood Association.
6 (Minimum 3/4-inch thickness).

7 D. Form Ties: Use form ties which do not leave an open hole through the concrete and
8 which permit neat and solid patching at every hole. Use embedded rods with integral
9 waterstops and cones to provide a 1-inch breakback. Wire ties and wood spreaders will
10 not be permitted.

11 E. Form Coatings: Form release coating shall be a paraffin base oil or mineral oil coating
12 which effectively prevents absorption of moisture; prevents bonding with concrete; is
13 non-staining to concrete; and leaves the concrete with a paintable surface.

14 F. Chamfer Strips: Chamfer strips shall be polyvinyl strips or acceptable equal, designed to
15 be nailed in the forms to provide a 3/4-inch chamfer (unless indicated otherwise) at
16 exposed edges of concrete members.

17 **PART 3 - EXECUTION**

18 3.01 INSTALLATION

19 A. Construction of Formwork: Forms shall be sufficiently strong to withstand the pressure
20 resulting from the placement and vibration of concrete and shall be sufficiently rigid to
21 maintain specified tolerances. Forms shall be sufficiently tight to prevent loss of mortar,
22 and shall be adequately braced against lateral, upward or downward movement.

23 B. Coating of Forms: Apply form coating to board forms prior to placing reinforcing. Keep
24 form coatings off steel reinforcing, items to be embedded, and previously placed concrete.

25 C. Form Erection:

26 1. Provide a means of holding adjacent edges, ends of panels, and ends of sections
27 tightly together and in accurate alignment so as to prevent the formation of ridges,
28 fins, offsets, or similar surface defects of the finished concrete. Insure that forms may
29 be removed without damage to the surface of the finished concrete.

30 2. Provide a positive means of adjustment of shores and struts. Insure that all settlement
31 is taken up during concrete placing.

32 3. Temporary openings shall be provided in wall forms to limit the free fall of concrete to a
33 maximum of 6-feet unless an elephant trunk is used. Such openings shall be located to
34 facilitate placing and consolidation and shall be spaced no more than 8-feet apart.
35 Temporary openings shall also be provided in the bottom of the wall, column forms, and
36 elsewhere as necessary to facilitate cleaning and observation immediately prior to
37 placing.

- 1 4. Do not embed any form-tying device or part thereof other than metal in concrete.
- 2 5. Form surfaces of concrete members except where placement of the concrete is against
- 3 the ground. The dimensions of concrete members shown on the Drawings apply to
- 4 formed surfaces, except where otherwise indicated.

5 D. Form Reuse: Reuse only forms which maintain a uniform surface texture on exposed
 6 concrete surfaces. Apply light sanding between uses to obtain such a uniform texture.
 7 Plug unused tie rod holes with corks, shave flush, and sand the concrete surface side of
 8 the plug.

9 E. Removal of Forms

- 10 1. Forms and shoring for elevated structural slabs, girders, and/or beams shall remain in
- 11 place until the concrete has reached a compressive strength equal to the specified 28-
- 12 day compressive strength as determined by test cylinders. Do not remove supports
- 13 and re-shore. The following table indicates the minimum allowable time after the last
- 14 concrete is placed before forms, shoring, and/or bracing may be removed.

15
16

Structural Item	Minimum Allowable Time
Bottom side of slabs, girders, beams	When concrete reaches specified 28-day compressive strength
Vertical sides of girders, beams	48-hours
Walls not supporting vertical or horizontal loads	48-hours
Walls supporting vertical or horizontal loads	When concrete reaches specified 28-day compressive strength
Footings, pipe encasements, pipe supports	24-hours

17

- 18 2. Do not remove forms from concrete which has been placed with outside air
- 19 temperature below 50° F without first determining if the concrete has properly set
- 20 regardless of the minimum times specified in the table above. Do not apply heavy
- 21 loading on recently poured concrete. Immediately after forms are removed, the
- 22 surface of the concrete shall be carefully examined and any irregularities in the
- 23 surface shall be repaired and finished as specified.

24 F. Formed Openings: Openings shall be of sufficient size to permit final equipment
 25 alignment without deflection or offsets of any kind. Where the items pass through the
 26 wall, allow space for packing to ensure watertightness. Provide openings with
 27 continuous keyways with waterstops where required. Provide a slight flare to facilitate
 28 grouting and the escape of entrained air during grouting. Provide reinforcement as
 29 indicated and specified. Reinforcing steel shall be at least 2-inches clear from the
 30 opening.

1 G. Embedded Items: Set anchor bolts and other embedded items accurately and hold
2 securely in position in the forms until the concrete is placed and set. Check all special
3 castings, channels, or other metal parts that are to be embedded in the concrete prior to
4 and again after concrete pour. Check all nailing, blocks, plugs, and strips necessary for
5 the attachment of trim, finish, and similar work prior to concrete pour.

6 H. Pipes and Wall Spools Cast in Concrete
7 1. Install wall spools, wall flanges, and wall anchors before placing concrete. Do not
8 weld, tie or otherwise connect the wall spools to the reinforcing steel.
9 2. Support pipe and fabricated fittings to be encased in concrete on concrete piers or
10 pedestals. Carry concrete supports to firm foundations so that no settlement will be
11 possible during Construction.

12 I. Form Tolerances
13 1. Failure of the forms to produce the specified concrete surface tolerance shall be
14 grounds for rejection of the concrete work. Rejected Work shall be repaired or
15 replaced at no cost to the County.
16 2. The following table indicates tolerances or allowable variations from dimensions or
17 positions of structural concrete work:
18

	Maximum Tolerance
Sleeves and inserts	+1/4-inch to -1/4-inch
Projected ends of anchors	+1/4-inch to -0.0-inch
Anchor bolt setting	+1/4-inch to -1/4-inch
Finished concrete	+ 1/4-inch to -1/4-inch in 10 feet of length

19
20 The planes or axes from which the above tolerances are to be measured shall be as
21 follows:
22

Sleeves and inserts	Centerline of sleeve or insert
Projected ends of anchors	Plane perpendicular to the end of the anchor as located on the Drawings
Anchor bolt setting	Centerline of anchor bolts
Finished concrete	The concrete surface as located on the Drawings

23
24 3. Where equipment is to be installed, comply with manufacturer's tolerances if more
25 stringent than above.
26

27
END OF SECTION

- 1 manufacturer.
- 2 B. Welded Wire Fabric: ASTM A185, galvanized.
- 3 C. Metal Bar Supports: CRSI MSP-2, Chapter 3, Class 2, Type B, Stainless Steel Protected
4 Bar Supports.
- 5 D. Coupler Splice Devices: Cadweld tension couplers capable of developing the ultimate
6 strength of the bar, as manufactured by Erico Products, Incorporated, Solon, Ohio, or
7 equal where acceptable to the County.

8 **2.03 FABRICATION**

- 9 A. Fabrication shall meet all requirements of the specified standards. Unless otherwise
10 indicated, the following shall apply:
- 11 1. Hooks shall be standard hooks.
- 12 2. Bottom bars shall extend a minimum of 6-inches into supporting members.
- 13 3. Minimum cover shall be measured to the outermost stirrup, tie or bar.
- 14 4. Splices are permitted only where indicated on the Drawings.

15 **PART 3 - EXECUTION**

16 **3.01 INSTALLATION**

- 17 A. Supporting Reinforcing: Bar supports shall be provided as required by CRSI MSP-2 and
18 AC1315. Top and bottom bars in slabs formed on earth shall be supported on precast
19 concrete block supports except where such bars are properly supported from formwork.
20 Precast concrete block supports are not required in slabs formed on tremie concrete but
21 may be used at the Contractor's option.
- 22 B. Placing Reinforcing: Placing of reinforcing steel and welded wire fabric shall conform to
23 CRSI MSP-2, ACI 315, and the Drawings. Reinforcing shall be securely tied and
24 supported to prevent displacement during concrete placement.
- 25 C. Welded Wire Fabric: Splices in welded wire fabric shall be such that the overlap between
26 outermost cross wires of each fabric sheet is not less than the spacing of the cross wires,
27 plus 2-inches. Fabric shall not be extended through expansion joints or construction
28 joints in slabs on grade except as otherwise indicated on the Drawings.
- 29 D. Coupler Splice: Unless indicated on the Drawings or where conventional lap splices
30 cannot be achieved, full positive tension connections shall be provided. Such devices
31 shall be installed in accordance with the recommendations of the manufacturer.
- 32 E. Dowels: Dowels shall be wired in position prior to placing concrete.
- 33 F. Field Bending: Heat shall not be used to bend bars. Bars shall not be bent after being
34 embedded in concrete.

- 1 G. Welding: Welding of reinforcing will not be permitted.
- 2 H. Place reinforcement a minimum of 2-inches clear of any metal pipe or fittings.
- 3

4 END OF SECTION

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- 1 2. Materials: Satisfactory evidence shall be submitted indicating those materials to be
2 used (including cement, aggregates and admixtures) meet the specified requirements.
- 3 3. Design Mix: The design mix to be used shall be prepared by qualified persons and
4 submitted for review. Submit affidavit as to design mix performance over the
5 preceding 6-months. The design of the mix is the responsibility of the Contractor
6 subject to the limitations of the Specifications. Acceptance of this submission will be
7 required only as minimum requirements of the Specifications have been met. Such
8 acceptance will in no way alter the responsibility of the Contractor to furnish concrete
9 meeting the requirements of the Specifications relative to strength and slump.
- 10 4. Ready Mix Concrete: Provide delivery tickets or weigh master's certificate per ASTM
11 C 94, including weights of cement and each size aggregate, amount of water in the
12 aggregate, and amount of water added at the plant. The amount of water added on the
13 job shall be written on the ticket.

14 **PART 2 - PRODUCTS**

15 2.01 GENERAL

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

18 2.02 MATERIALS

19 A. Cement

- 20 1. Cement for all concrete shall be domestic Portland cement that conforms to the
21 requirements of ASTM Designation C 150 Type I, Type II or Type III. All sanitary
22 sewer manholes, wetwells, pumping stations, tanks and structures exposed to
23 wastewater shall be constructed with Type II cement. Type III cement for high early
24 strength concrete shall be used only for special locations and only with the review and
25 acceptance of the County. Type I cement may be used for buildings and tremie
26 concrete.
- 27 2. Only 1 brand of cement shall be used in any individual structure unless acceptable by
28 the County. Cement that has become damaged, partially set, lumpy or caked shall not
29 be used and the entire contents of the sack or container that contains such cement will
30 be rejected. No salvaged or reclaimed cement shall be used.
- 31 3. Fly ash shall not be used in either Class A or Class B concrete.

32 B. Aggregates:

- 33 1. ASTM C 33. Coarse aggregates shall be size No. 57. Block cell fill shall be size No.
34 89.
- 35 2. In addition to requirements of ASTM C 33 for structures exposed to wastewater, the
36 following shall apply:
 - 37 a. Soft particles: 2% (2.0 percent)
 - 38 b. Chert as a soft impurity (defined in Table 3 of ASTM C 33): 1% (1.0 percent)
 - 39 c. Total of soft particles and chert as a soft impurity: 2% (2.0 percent)
 - 40 d. Flat and elongated particles (long dimension > 5 times short dimension): 15%.

- 1 C. Water: Clean and free from injurious amounts of deleterious materials.
- 2 D. Air Entraining Admixture: ASTM C 260.
- 3 E. Water Reducing and Retarding Admixture: ASTM C 494, Type D. Admixture shall not
4 contain calcium chloride.
- 5 F. Epoxy Bonding Agent: Sikastix 370, Sikadur Hi Mod, Concsive 1001-LPL or
6 acceptable equal.
- 7 G. Waterproofing Material: Concrete admixture shall be manufactured and supplied by an
8 approved manufacturer as shown in the Appendix D "List of Approved Products."

9 2.03 MIXES

10 A. General Requirements

- 11 1. Mix Design: Proportioning shall be on the basis of field experience and/or trial
12 mixtures as specified in ACI 318, Section 4.3. Data on consecutive compression tests
13 and standard deviation shall be submitted. Proportioning for small structures may be
14 by the water/cement ratio under special review and acceptance by the County.
15 Concrete mix design shall comply with the Standard Building Code requirements.
- 16 2. Air Content: 5% plus or minus (\pm) 1% (Class A and B).
- 17 3. Slump: 4-inches plus or minus (\pm) 1-inch. 8-inches plus or minus (\pm) 1-inch for
18 tremie concrete.
- 19 4. Water/cement ratio = 0.45 maximum (all concrete exposed to hydrostatic loading),
20 0.50 maximum (all other concrete).
- 21 5. Minimum Compressive Strength at 28-days
22 a. Class A, 4,000-psi: Water and wastewater structures inclusive of tanks, ditches,
23 pumping stations, tremie concrete and other structures in contact with process
24 water.
25 b. Class B, 3,000-psi: Building structures, curb and gutters, slabs, walks,
26 encasements, thrust blocks, and pipe supports, etc. not in contact with process
27 water.
28 c. Class C, 2,500-psi: Mix wherever specified in the standard drawings such as
29 A103, A112, A303, A406 and A407-2.

30 B. Production of Concrete

- 31 1. General: Concrete shall be ready mixed and shall be batched, mixed and transported
32 in accordance with ASTM C 94, except as otherwise indicated.
- 33 2. Air Entraining Admixture: Air entraining admixture shall be charged into the mixture
34 as a solution and shall be measured by means of an acceptable mechanical dispensing
35 device. The liquid shall be considered a part of the mixing water.

- 1 3. Waterproofing admixture: New concrete structures shall contain a crystalline
2 waterproofing concrete admixture. Crystalline waterproofing concrete admixture
3 shall be added to the concrete during the batching operation. The admixture
4 concentration shall be added based upon manufacturer design percent concentration
5 of admixture to the required weight of cement. The amount of cement shall remain
6 the same and not be reduced. A colorant shall be added to verify the admixture was
7 added to the concrete for all precast structures. Colorant shall be added and provided
8 at the admixture manufacturing facility, not at the concrete batch plant. It is
9 recommended that the admixture be added first to the rock and sand and blended
10 thoroughly before adding cement and water or per the manufacturer's
11 recommendations. Concrete structures without crystalline waterproofing admixture
12 or admixture without colorant for field verification shall be rejected. Contractor shall
13 provide certification the admixture was installed in accordance with the
14 manufacturer's recommendations.
- 15 4. Water Reducing and Retarding Admixture: Water reducing and retarding admixture
16 shall be added and measured as recommended by the manufacturer. The addition of
17 the admixture shall be completed within 1-minute after addition of water to the
18 cement has been completed, or prior to the beginning of the last 3/4 of the required
19 mixing, whichever occurs first. Admixtures shall be stored, handled and batched in
20 accordance with the recommendations of ACI 68.
- 21 C. Delivery Tickets: In addition to the information required by ASTM C 94, delivery tickets
22 shall indicate the cement content and the water/cement ratio.
- 23 D. Temperatures: The temperature of the concrete upon delivery from the truck shall not
24 exceed 90° F.
- 25 E. Modifications to the Mix: No modifications to the mix shall be made in the plant or on
26 the job which will decrease the cement content or increase the water/cement ratio beyond
27 that specified.

28 **PART 3 - EXECUTION**

29 3.01 PREPARATION

- 30 A. Preparations before Placing: No concrete shall be placed until the review and acceptance
31 of the County has been received. Acceptance will not be granted until forms are clean
32 and reinforcing and all other items required to be set in concrete have been placed and
33 thoroughly secured. The County shall be notified a minimum of 24-hours before
34 concrete is placed.
- 35 B. Conveying:
- 36 1. General: Concrete shall be handled from the truck to the place of final deposit as
37 rapidly as practicable by methods which will prevent segregation or loss of
38 ingredients to maintain the quality of the concrete. No concrete shall be placed more
39 than 90-minutes after mixing has begun for that particular batch.

- 1 2. Buckets and Hoppers: Buckets and hoppers shall have discharge gates with a clear
2 opening equal to no less than 1/3 of the maximum interior horizontal area, or 5 times
3 the maximum aggregate size being used. Side slopes shall be no less than 60°
4 (degrees). Controls on gates shall permit opening and closing during the discharge
5 cycle.
- 6 3. Runways: Extreme care shall be exercised to avoid displacement of reinforcing
7 during the placing of concrete.
- 8 4. Elephant Trunks: Hoppers and elephant trunks shall be used to prevent the free fall of
9 concrete of more than 6-feet.
- 10 5. Chutes: Chutes shall be metal or metal lined and shall have a slope not exceeding 1
11 vertical to 2 horizontal and not less than 1 vertical to 3 horizontal. Chutes more than
12 20-feet long and chutes not meeting the slope requirements may be used only if they
13 discharge into a hopper before distribution.
- 14 6. Pumping Equipment: Pumping equipment and procedures shall conform to the
15 recommendations contained in the report of ACI Committee 304 on "Placing Concrete
16 by Pumping Methods," ACI 304.2R-71. The specified slump shall be measured at the
17 point of discharge. The loss of slump in pumping shall not exceed 1-1/2-inches.
- 18 7. Conveying equipment Construction: Aluminum or aluminum alloy pipe for tremies or
19 pump lines and chutes, except for short lengths at the truck mixer shall not be
20 permitted.
- 21 8. Cleaning: Conveying equipment shall be cleaned at the end of each concrete
22 operation.

23 3.02 APPLICATION

24 A. Placing:

- 25 1. General: Concrete shall be deposited continuously, or in layers of such thickness (not
26 exceeding 2-feet in depth) that no concrete will be deposited on concrete that has
27 hardened sufficiently to cause the formation of seams or planes of weakness.
- 28 2. Supported Elements: At least 2-hours shall elapse after depositing concrete in
29 columns or walls before depositing in beams, girders, or slabs supported thereon.
- 30 3. Segregation: Concrete shall be deposited as nearly as practicable in its final position
31 to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to
32 procedures that will cause segregation.
- 33 4. Concrete Underwater: All concrete, except that indicated on the Drawings as tremie
34 concrete, shall be placed in the dry.

35 B. Seals and Tremie Concrete

36 1. General

- 37 a. Wherever practicable, all foundation excavations shall be dewatered and the
38 concrete deposited in the dry. Where conditions are encountered which render it
39 impracticable to dewater the foundation before placing concrete, a concrete
40 foundation seal shall be placed. The foundation shall then be dewatered, and the
41 balance of the concrete placed in the dry.

- 1 b. When seal concrete is required to be placed, the satisfactory performance of the
2 seal in providing a watertight excavation for placing structural concrete shall be
3 the responsibility of the Contractor. Seal concrete placed by the Contractor,
4 which subsequently fails to perform properly, shall be repaired as necessary to
5 perform its required function, at the expense of the Contractor.
- 6 2. Method of Placing: Concrete deposited underwater shall be carefully placed in the
7 space in which it is to remain by means of a tremie, a closed-bottom dump bucket of
8 not less than 1-cubic yard capacity, or other approved method, and shall not be
9 disturbed after it is deposited. All seal concrete shall be deposited in 1 continuous
10 pour. No concrete shall be placed in running water. All formwork designed to retain
11 concrete underwater shall be watertight, and the design of the formwork and
12 excavation sheeting shall be by a Professional Engineer, registered in the State of
13 Florida.
- 14 3. Use of Tremie: The tremie shall consist of a tube having a minimum inside diameter
15 of 10-inches, and shall be constructed in sections having tight joints. No aluminum
16 parts that have contact with the concrete will be permitted. The discharge end shall
17 be entirely seated at all times, and the tremie tube kept full to the bottom of the
18 hopper. When a batch is dumped into the hopper, the tremie shall be slightly raised
19 (but not out of the concrete at the bottom) until the batch discharges to the bottom of
20 the hopper, after which the flow shall be stopped by lowering the tremie. The means
21 of supporting the tremie shall be such as to permit the free movement of the discharge
22 end over the entire top surface of the Work, and shall permit it being lowered rapidly
23 when necessary to choke off or retard the flow. The flow shall preferably be
24 continuous, and in no case shall be interrupted until the Work is completed. Special
25 care shall be exercised to maintain still water at the point of deposit.
- 26 4. Use of Bottom-dump Bucket: When the concrete is placed by means of a bottom-
27 dump bucket, the bucket shall be lowered gradually and carefully until it rests upon
28 the concrete already placed. The bucket shall then be raised very slowly during the
29 discharge travel; the intent being to maintain, as nearly as possible, still water at the
30 point of discharge and to avoid agitating the mixture. Aluminum buckets will not be
31 permitted.
- 32 5. Time of Beginning Pumping: Pumping to dewater a sealed cofferdam shall not
33 commence until the seal has set sufficiently to withstand the hydrostatic pressure, and
34 in no case earlier than 72-hours after placement of the concrete.
- 35 C. Consolidating Concrete:
- 36 1. General: Concrete shall be consolidated by means of internal vibrators operated by
37 competent workmen.
- 38 2. Vibrators: Vibrators shall have a minimum head diameter of at least 2-inches, a
39 minimum centrifugal force of 700-pounds and a minimum frequency of 8,000
40 vibrations per second.
- 41 3. Vibrators for Confined Areas: In confined areas, the specified vibrators shall be
42 supplemented by others having a minimum head diameter of 1-1/2-inches, a
43 minimum centrifugal force of 300-pounds and a minimum frequency of 9,000
44 vibrations per second.

- 1 4. Spare Vibrator: One (1) spare vibrator for each 3 in use shall be kept on the site
2 during all concrete placing operations.
3 5. Use of Vibrators: Vibrators shall be inserted and withdrawn at points approximately
4 18-inches apart. The duration of each insertion shall be from 5 to 15-seconds.
5 Concrete shall not be transported in the forms by means of vibrators.
- 6 D. Protection: Rainwater shall not be allowed to increase the amount of mixing water, or to
7 damage the surface finish. Concrete shall be protected from construction over-loads.
8 Design loads shall not be applied until the specified strength has been attained.

9 3.03 CONCRETE FINISHING AND CURING

- 10 A. All slabs exposed to view shall receive a steel trowel finish without local depressions or
11 high points and apply a light hair-broom finish. Do not use stiff bristle brooms or
12 brushes. Leave hair-broom lines parallel to the direction of slab drainage.
- 13 B. All other slabs and footings shall receive a smooth steel trowel finish.
- 14 C. All walls of structures or parts of buildings exposed to view shall receive the following:
15 1. Repair defective concrete, remove fins, fill depressions 1/4-inch or deeper, and fill tie
16 holes.
17 2. Any surface not receiving a special applied finish, shall receive a slurry finish
18 consisting of 1 part cement and 1-1/2 parts sand by damp loose volume. Dampen
19 surfaces and then apply the slurry with clean burlap pads or sponge rubber floats.
20 Remove any surplus by scraping and then rubbing with clean burlap.
21 3. Surfaces that will receive a special applied finish shall be of even color, have no pits,
22 pockets, holes, or sharp changes of surface elevation. Scrubbing with a stiff bristle
23 fiber brush shall produce no dusting or dislodging of cement or sand.
- 24 D. All concrete shall be wet cured a minimum of 7-days; or if not to receive special finishes,
25 coatings or concrete toppings, an acceptable curing compound may be utilized.
- 26 E. All surface defects shall be repaired by removing defective concrete down to sound
27 concrete and repairing with patching mortar. Finished repair shall match adjacent
28 concrete and be cured as specified.

29 3.04 TESTING

- 30 A. A testing laboratory, acceptable by the County, shall perform required testing. The
31 Contractor shall pay for all tests indicating a failure to comply with the Specifications.
32 The Contractor shall keep the laboratory informed of his schedule.

1 B. Standard laboratory compressive test cylinders shall be obtained by the laboratory when
2 concrete is discharged at the point of placing (i.e., discharge end of pumping equipment),
3 and cylinders shall be made and cured in accordance with the requirements of ASTM
4 Designation C 31. A set of 4 cylinders shall be obtained for each 50-cubic yards, or
5 fraction thereof, placed each day for each type of concrete. The cylinders shall be cured
6 under laboratory conditions and shall be tested at 7 and 28-days of age in accordance
7 with the requirements of ASTM Designation C 39.

8 C. The testing laboratory shall make slump tests of Class A and Class B concrete as it is
9 discharged from the mixer at the point of placing. Slump tests shall be made for each 25-
10 cubic yards or "pour" of concrete placed. Slump tests may be made on any batch, and
11 failure to meet specified slump requirements shall be sufficient cause for rejection of that
12 batch.
13

14 END OF SECTION

1 1.04 INSPECTION

- 2 A. The quality of all materials, the process of manufacture, and the finished sections shall be
3 subject to inspection and acceptance by the County. Such inspection may be made at the
4 place of manufacture or at the site after delivery, or at both places, and the sections shall be
5 subject to rejection at any time due to failure to meet any of the specification requirements;
6 even though sample sections may have been acceptable as satisfactory at the place of
7 manufacture. Sections rejected after delivery to the job shall be marked for identification
8 and shall be removed from the job at once. All damaged sections will be rejected. If
9 damaged sections have already been installed; they shall be acceptably repaired if
10 authorized by the County, or removed and replaced at the Contractor's expense.
- 11 B. At the time of inspection, the sections will be carefully examined for compliance with the
12 ASTM designation specified and the acceptable manufacturer's drawings. All sections
13 shall be inspected for general appearance, dimension, "scratch strength", blisters, cracks,
14 roughness, and soundness. The surface shall be dense and close textured.
- 15 C. Imperfections may be repaired subject to the review and acceptance of the County after
16 demonstration by the manufacturer that strong and permanent repairs result. Repairs shall be
17 carefully inspected before final review and acceptance. Cement mortar used for repairs shall
18 have a minimum compressive strength of 4,000-psi at the end of 7-days and 5,000-psi at the
19 end of 28-days, when tested in 3-inch by 6-inch cylinders stored in the standard manner.
20 Epoxy mortar may be utilized for repairs subject to the review and acceptance of the County.

21 **PART 2 - PRODUCTS**

22 2.01 GENERAL

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

25 2.02 PRECAST CONCRETE SECTIONS

- 26 A. Precast concrete wetwell sections, manhole barrel and eccentric top sections shall
27 conform to specifications for precast reinforced concrete manhole sections, ASTM
28 Designation C478, except as otherwise specified below or as shown on the Drawings.
29 Details of precast sections shown on the Drawings, including thickness and reinforcing,
30 shall supersede ASTM C-478 when such details are more stringent than ASTM C-478.
31 The method of construction shall conform to the detailed Drawings appended to these
32 specifications and the following additional requirements:
- 33 1. The minimum wall thickness for the various size barrel sections shall be 5-inches, or
34 as indicated in the Drawings.
 - 35 2. Barrel sections shall have tongue and groove joints. Joints shall be sealed with cold
36 adhesive preformed plastic gaskets set in double rows on the tongue and in the groove
37 prior to setting the next section. Gaskets shall be K.T. Snyder "Ram-Nek", Conseal "CS-
38 102" or acceptable equal. All extension joints shall be sealed with Portland Type II
39 cement after setting of gasket and placement of manhole section into a watertight joint.

- 1 3. Type II cement shall be used except as otherwise accepted.
- 2 4. New concrete structures shall contain a crystalline waterproofing concrete admix for
- 3 all new concrete structures including but not limited to manholes, ARV vaults,
- 4 wetwells, and wetwell top slabs. Crystalline waterproofing concrete admix shall be
- 5 added to the concrete during the batching operation. Admixture concentration shall
- 6 be added based upon manufacturer's design percent concentration of admixture to the
- 7 required weight of cement. The amount of cement shall remain the same and not be
- 8 reduced. A colorant shall be added to verify the admixture was added to the concrete.
- 9 Colorant shall be added and provided at the admixture manufacturing facility, not at
- 10 the concrete batch plant. It is recommended that the admixture be added first to the
- 11 rock and sand and blended thoroughly before adding cement and water or per the
- 12 manufacturer's recommendations. Concrete structures without crystalline
- 13 waterproofing admixture or admixture without colorant for field verification shall be
- 14 rejected. Contractor shall provide certification from the pre-caster that the admixture
- 15 was added in accordance with the manufacturer's recommendations. Concrete
- 16 admixture shall be manufactured and supplied by an approved manufacturer as shown
- 17 in Appendix D "List of Approved Products."
- 18 5. The date of manufacture and the name or trademark of the manufacturer shall be
- 19 clearly marked on the inside of each precast section. Each section must be inspected
- 20 and stamped by an accredited testing laboratory.
- 21 6. Sections shall be cured by an acceptable method for at least 28-days.
- 22 7. Manhole top sections shall be eccentric except that precast concrete slabs shall be
- 23 used where cover over the top of the pipe is less than 4-feet for all manholes. Lift
- 24 rings or non-penetrating lift holes shall be provided for handling precast manhole
- 25 sections. Non-penetrating lift holes shall be filled with non-shrink grout after
- 26 installation of the manhole sections.
- 27 8. Precast concrete slabs over top section, where required, shall be capable of supporting
- 28 the overburden plus a live load equivalent to ASHTO H 20 loading.
- 29 9. The tops of bases shall be suitably shaped to mate with the adjoining precast section.
- 30 10. Precast leveling rings for setting cast iron frames over manholes shall be 2-inch thick
- 31 and have 1 (one) Number 2 continuous reinforcing steel bar.
- 32 11. Concrete surfaces shall have form oil, curing compounds, dust, dirt, and other
- 33 interfering materials removed by brush sand blasting and shall be fully cured prior to
- 34 delivery.
- 35 12. Interior surfaces of manholes, wetwells and valve vaults shall be lined in accordance
- 36 with Appendix D "List of Approved Products."
- 37 13. Manholes to be installed around existing gravity sewers shall consist of a cast-in-
- 38 place concrete base slab and precast concrete barrel and top sections; lined per
- 39 Section 3410 – 2.01.11. The base slab shall be as shown on the Drawings and include
- 40 a joint which is compatible with the bottom barrel section and acceptable to the
- 41 County. The bottom barrel section shall include an inverted "U-shaped" slot to allow
- 42 installation of the section over existing pipes. Flow channels shall be provided within
- 43 the manholes as shown on the Drawings. Annular space between the existing pipe
- 44 and slot shall be made watertight with non-shrink grout. Existing pipes shall be
- 45 removed within the manhole and outlets plugged watertight with non-shrink grout as
- 46 shown on the Drawings.

1 14. The manholes shall have an invert channel shaped to correspond with the lower half
2 of the pipe. The top of the shelf shall be at the elevation indicated and shall be sloped
3 to drain toward the flowing through channel. Every effort shall be made by the
4 Contractor to construct watertight structures.

5 **PART 3 - EXECUTION**

6 3.01 INSTALLATION

- 7 A. All manholes and other precast structures shall be set in the dry.
- 8 B. Manholes and other precast structures shall be constructed to the dimensions as shown on
9 the Drawings and as specified herein.
- 10 C. The base structure may be cast-in-place concrete as specified in Division 3. The concrete
11 structure shall be placed on the required crushed stone base as shown in the Drawings
12 over a dry sub base of structural fill that has been compacted to 95% (percent) of the
13 maximum dry density as determined by the modified proctor test, ASTM D1557. The
14 tops of the cast in place bases shall be shaped to mate with the precast barrel section and
15 shall be adjusted in grade so that the top of the dome section is at the correct elevation.
- 16 D. Precast bases conforming to all requirements of ASTM C478 and other requirements for
17 precast sections may be used and shall be set on a sub base as described above.
- 18 E. Precast concrete structure sections shall be set vertically with sections in true alignment
19 with a 1/4-inch maximum tolerance per 5-feet of depth. The outside and inside joint shall
20 be filled with a non-shrink mortar and finished flush with the adjoining surfaces. Allow
21 joints to set for 24-hours before backfilling. Backfilling shall be accomplished bringing
22 the fill up evenly on all sides. If leaks appear in the structures, the inside joints shall be
23 caulked with non-shrink grout to the satisfaction of the County. The Contractor shall
24 install the precast sections in a manner that will result in a watertight joint.
- 25 F. Lift rings or non-penetrating lift holes shall be provided for handling pre-cast manhole
26 sections. Non-penetrating lift holes shall be filled with non-shrink grout after installation.
- 27 G. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be
28 done prior to setting them in place to prevent any subsequent jarring which may loosen
29 the mortar joints.
- 30 H. Cast iron frames shall be placed over precast concrete leveling rings, shimmed and set in
31 cement mortar to the required grade. No more than 3 courses of leveling rings shall be
32 used.
33

34 END OF SECTION

1 **SECTION 15062**

2 **DUCTILE IRON PIPE AND FITTINGS**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. Scope of Work: Furnish all labor, materials, equipment and incidentals required and
6 install, all ductile iron piping, ductile iron fittings, and appurtenances as shown on the
7 Drawings and as specified herein.

8 B. General Design: The equipment and materials specified herein are intended to be
9 standard types of ductile iron pipe and cast or ductile iron fittings for use in transporting
10 wastewater, potable water, and reclaimed water.

11 1.02 QUALITY ASSURANCE

12 A. Qualifications: All of the ductile iron pipe and ductile or cast iron fittings shall be
13 furnished by manufacturers who are fully experienced, reputable, and qualified in the
14 manufacture of the materials to be furnished. The pipe and fittings shall be designed,
15 constructed and installed in accordance with the best practices and methods and shall
16 comply with these specifications as applicable.

17 B. Standards:

- 18 1. ANSI A 21.50/AWWA C150
- 19 2. ANSI A-21.51/AWWA C151
- 20 3. ANSI A-21.41/AWWA C104

21 C. Factory Tests: The manufacturer shall perform the factory tests described in ANSI A-
22 21.51/AWWA C151.

23 D. Quality Control

- 24 1. The manufacturer shall establish the necessary quality control and inspection practice
25 to ensure compliance with the referenced standards. All pipe on this Project shall be
26 supplied by a single manufacturer unless otherwise accepted in writing by the
27 County.
- 28 2. In addition to the manufacturer's quality control procedures, the County may select an
29 independent testing laboratory to inspect the material at the foundry for compliance
30 with these specifications. The cost of foundry inspection requested by the County
31 will be paid for by the County.

1 1.03 SUBMITTALS

2 A. Materials and Shop Drawings

3 1. Submit Shop Drawings and piping layouts, including areas within and under
4 buildings and structures. Shop Drawings shall include dimensioning, methods and
5 locations of supports and all other pertinent technical specifications. Show locations
6 of all field cuts. Shop Drawings shall be prepared by the pipe manufacturer. Shop
7 Drawings for piping within and under buildings and structures shall be submitted
8 within 30-days of Execution of Contract.

9 B. Operating Instructions: Submit Operation and Maintenance Manuals in accordance with
10 Section 01001 "General Work Requirements."

11 C. Manufacturer's Certification

12 1. Submit manufacturer's sworn certification of factory tests and test results.

13 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

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

20 A. Delivery and Storage: Delivery and storage of the materials shall be in accordance with
21 the manufacturer's recommendations. Stored pipe shall be covered for protection against
22 contamination and UV light. Joint gaskets shall be stored in clean, dark and dry location
23 until immediately before use.

24 B. Handling: Care shall be taken in loading, transporting and unloading to prevent damage
25 to the pipe and fittings and their respective coatings. Pipe or fittings shall not be rolled
26 off the carrier or dropped. Pipe shall be unloaded by lifting with a forklift or crane. All
27 pipe or fittings shall be examined before installation and no piece shall be installed which
28 is found to be defective. Pipe shall be handled to prevent damage to the pipe or coating.
29 Accidental damage to pipe or coating shall be repaired to the satisfaction of the County or
30 be removed from the job. When not being handled, the pipe shall be supported on timber
31 cradles or on level ground, graded to eliminate all rock points and to provide uniform
32 support along the full pipe length. When being transported, the pipe shall be supported at
33 all times in a manner which will not permit distortion or damage to the lining or coating.
34 Any unit of pipe that, in the opinion of the County, is damaged beyond repair by the
35 Contractor shall be removed from the site.

1 **PART 2 - PRODUCTS**

2 2.01 MATERIALS

3 A. Ductile Iron Pipe

4 1. Standards: ANSI A-21.50, AWWA C150 and ANSI A-21.51, AWWA C151

5 2. Thickness/Pressure Class:

6 a. Below ground piping: Class 350 (4-inch to 12-inch), Class 250 (16-inch to 24-

7 inch) and Class 200 (30-inch to 64-inch) unless otherwise noted or specified.

8 b. Above ground piping: Flanged, Class 350 (minimum) unless otherwise noted or

9 specified.

10 3. Joints

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

12 (1) Standards: ANSI A21.11, AWWA C111

13 (2) Class: 350-psi working pressure rating

14 (3) Gaskets

15 (a) Potable and Reclaimed Water Service: Styrene Butadiene Rubber (SBR)

16 ring type.

17 (b) Wastewater Service: Neoprene rubber ring type.

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

19 (1) Standards: ANSI A21.15, ANSI B16.1

20 (2) Class: 125-pound factory applied screwed long hub flanges, plain faced

21 without projection.

22 (3) Gaskets

23 (a) Spans less than 10-feet: full-face 1/8-inch thick neoprene rubber

24 (b) Spans greater than 10-feet: Toruseal gaskets as manufactured by American

25 Cast Iron Pipe or acceptable equal.

26 c. Restrained Joints

27 (1) Manufacturers: Lok-Ring system (all sizes) or locking type gasket systems

28 (for 16-inch diameter and smaller) as manufactured by American Ductile Iron

29 Pipe; MEGALUG System as manufactured by EBBA Iron; or acceptable

30 equal.

31 (2) Class: 250-psi minimum design pressure rating.

32 (3) Standard mechanical joint retainer glands shall not be acceptable.

33 d. Joint Accessories

34 (1) Mechanical joint bolts, washers and nuts: Ductile iron or Corten steel.

35 (2) Flanged joint bolts, washers and nuts: 316 stainless steel with bolts and nuts

36 conforming to ASTM A193 Grade B8M.

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

38 4. Pipe Identification

39 a. Each length of pipe shall bear the name or trademark of the manufacturer, the

40 location of the manufacturing plant, and the class or strength classification of the

41 pipe. The markings shall be plainly visible on the pipe barrel. Pipe which is not

42 clearly marked is subject to rejection. The Contractor shall remove all rejected

43 pipe from the project site within five NORMAL WORKING DAYS.

1 B. Fittings

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

21 2.02 COATINGS, LININGS AND IDENTIFICATION MARKINGS

22 A. Exterior Coatings

- 23 1. Below ground/buried or in a casing pipe:
- 24 a. Type: Asphaltic coating, 1.0-mil DFT in accordance with ANSI/AWWA
25 A21.51/C151.
- 26 b. Markings: (continuous 3-inch wide strip within top 90 degrees of pipe - min.
27 drying time 30-minutes before backfill).
- 28 c. Color:
- 29 (1) Raw Wastewater: Safety Green
- 30 (2) Reclaimed Water: Purple (Pantone 522C)
- 31 (3) Potable Water: Safety Blue
- 32 2. Above ground/Exposed/In vaults
- 33 a. Coatings and coating testing for ductile iron pipe and fittings for above
34 ground/exposed applications shall be accordance with Division 9. Primer,
35 intermediate and final coats whether shop or field applied shall be compatible and
36 applied in accordance with the coating system manufacturer's recommendations.
37 Refer to Appendix D "List of Approved Products" for approved coating system
38 suppliers. Asphaltic seal coat applied to the exterior of above ground piping and
39 fittings shall be blasted and completely removed prior to coating per NACE-
40 3/SSPC-SP6 commercial blast cleaning minimum angular anchor profile of 1.5-
41 mils.

- 1 b. Color
2 (1) Raw Wastewater: Safety Green
3 (2) Reclaimed Water: Purple (Pantone 522C)
4 (3) Potable Water: Safety Blue
5 3. Inside Wetwell
6 a. All piping inside of wastewater wetwell shall be 316 stainless steel.
- 7 B. Interior Lining (Applied by pipe manufacturer)
8 1. Wastewater: Interior coating shall be Protecto 401 (amine cured novalac epoxy
9 containing at least 20% by volume of ceramic quartz pigment) for all pipe and
10 fittings. All ductile iron pipe and fittings shall be delivered to the manufacturer
11 certified applicator without asphalt, cement lining, or any other lining on the interior
12 surface and no coating shall have been applied to the first 6-inches of the exterior of
13 the DIP spigot ends. Minimum surface preparation shall be SSPC-SP 1 Solvent
14 Cleaning method to remove oil and grease followed by NACE-4 / SSPC-SP7 Brush-
15 Off Blast Cleaning. Protecto 401 shall be applied within 12-hours of surface
16 preparation to the interior of the pipe and fittings so as to obtain a continuous and
17 relatively uniform and smooth integral lining with a total minimum dry film thickness
18 of 40-mils for the complete system. No lining shall take place when the substrate or
19 ambient temperature is below 40°F. The lining shall not be used on the face of the
20 flange of fittings or flanged pipe. The system shall be holiday free and holiday
21 testing (minimum 2000 volts) shall be conducted and pinholes shall be repaired prior
22 to shipping.
23 2. Potable Water and Reclaimed Water: Interior coating shall be fusion-bonded epoxy
24 (FBE) or Cement Mortar lined with asphaltic seal coat.
25 a. FBE for Fittings: Fittings shall be supplied with a FBE coating, both inside and
26 outside for total protection including flanged and buried fittings. The exterior of
27 flanged fittings for above ground assemblies shall adhere to final exterior coating
28 requirements per 3119 2.04 A. The FBE coating system shall meet or exceed
29 ANSI/AWWA C-550 and C116/A21.116 requirements and shall have NSF 61
30 certification. FBE coating thickness shall be 6 to 8-mils dry film thickness, shall
31 be applied for secure adhesion, shall have a smooth surface and shall be holiday
32 free.
33 b. Cement mortar lining with a seal coat of asphaltic material shall be in accordance
34 with ANSI/AWWA A21.4/C104.
- 35 C. Polyethylene Encasement is required when pipe is within 10-feet of a gas main or as
36 indicated on the Drawings:
37 1. Standard: ANSI A 21.5/AWWA C105, 8-mil minimum thickness.

1 2.03 LOCATION MARKERS AND LOCATION WIRE

2 A. Electronic Markers and Locator System (for reclaimed water and wastewater ONLY)

- 3 1. Markers: Markers shall consist of a passive device capable of reflecting a specifically
4 designated repulse frequency tuned to the utility (service) being installed. Markers
5 shall be color coded in accordance with American Public Works Association's
6 "Utility Locating and Coordinating Council Standards." Colors shall be: Wastewater
7 and Reclaimed Water - #1404 Green. Markers shall be full range. Markers shall be
8 installed directly above the centerline of the respective pipeline at intervals not to
9 exceed 100-feet, at each fitting (tees, wyes, crosses, reducers, plugs, caps and bends)
10 or change in horizontal direction and at each valve along the pipeline. Markers shall
11 be hand backfilled to 1-foot above the pad and have a finished depth of burial of not
12 less than 2-feet or more than 6-feet. No separate payment shall be made for
13 furnishing and installing the respective frequency and color-coded electronic pad type
14 marker.
- 15 2. Locator System: Marker locator set shall be the Scotch Mark EM II Electronic
16 Marker Locator Path Tracing Receiver, or acceptable equal. The Contractor shall
17 furnish 1-locator set for each type of service piping installed on the project (i.e.:
18 reclaimed water, wastewater) to the County. Each unit shall incorporate the
19 following features and accessories:
- 20 a. Unit(s) shall be tuned to the proper frequency for each type (service) of piping.
 - 21 b. Field strength meter that provides visual indication of the return signal.
 - 22 c. Function switch for selection of operation mode.
 - 23 d. Sensitivity control to adjust the receiver gain.
 - 24 e. Audio speaker for signal response.
 - 25 f. Battery access panel containing condensed operating instructions.
 - 26 g. Auxiliary headset and heads set jack.
 - 27 h. Permanently attached shoulder straps.
 - 28 i. Rugged shockproof and weatherproof storage/carrying case.
- 29 3. Manufacturer: System shall be Scotch Mark Locator System, or acceptable equal.

30 B. Location Detection Wire

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

1 **PART 3 - EXECUTION**

2 3.01 INSTALLATION

3 A. Ductile iron pipes shall be installed in accordance with AWWA C600 and AWWA
4 Manual M-42. When a restraining type gasket is used, the bell shall be painted red.

5 B. Underground Ductile Iron Pipe and Fittings.

6 1. Bedding firm, dry and even bearing of suitable material. Blocking under the pipe will
7 not be permitted.

8 2. Placement

9 a. Alignment: In accordance with lines and grades shown on the Drawings.
10 Deflection of joints shall not exceed 75% of the values recommended by the pipe
11 manufacturer.

12 b. The Contractor shall provide line and grade stakes at a 100-foot maximum
13 spacing and at all line and/or grade change locations. The Contractor shall
14 provide temporary benchmarks at a maximum of 1,000-foot intervals. The
15 minimum pipe cover shall be 30-inches below the finished grade surface or 30-
16 inches below the elevation of the edge of pavement of the road surface whichever
17 is greater.

18 c. All pipe and fittings shall be inspected prior to lowering into trench to insure no
19 cracked, broken or otherwise defective materials are being used. All homing
20 marks shall be checked for the proper length so as to not allow a separation or
21 over homing of connected pipe. Homing marks incorrectly marked greater than
22 1-inch shall result in rejection of pipe and removal from site. The Contractor
23 shall clean ends of pipe thoroughly and remove foreign matter and dirt from
24 inside of pipe and keep clean during and after installation.

25 d. Proper implements, tools and facilities shall be used for the safe and proper
26 protection of the Work. Pipe shall be lowered into the trench in such a manner as
27 to avoid any physical damage to the pipe. Pipe shall not be dropped or dumped
28 into trenches under any circumstances.

29 e. Trench Dewatering and Drainage Control: Contractor shall prevent water from
30 entering trench during excavation and pipe-laying operations to the extent
31 required to properly grade the bottom of the trench and allow for proper
32 compaction of the backfill. Pipe shall not be laid in water.

33 f. Pipe Laying in Trench: Dirt or other foreign material shall be prevented from
34 entering the pipe or pipe joint during handling or laying operations and any pipe
35 or fitting that has been installed with dirt or foreign material in it shall be
36 removed, cleaned and re-laid. Pigging of pipe may be used to remove foreign
37 materials in lieu of flushing. At times when pipe installation is not in progress,
38 the open ends of the pipe shall be closed by a watertight plug or by other means
39 approved by the County to ensure absolute cleanliness inside the pipe. The pipe
40 shall be installed with the color stripe and pipe text on the top of pipe.

1 3. Cutting: When required, cutting shall be done by machine, leaving a smooth cut at
2 right angles to the axis of the pipe. Cut ends of the pipe to be used with a push-on
3 bell shall be beveled. Bare metal exposed at ends of the pipe shall be field coated in
4 accordance with pipe manufacturer's recommendations. Cut pipe for wastewater
5 service shall have exposed bare metal ends repaired with Protecto 401 using the
6 coating system manufacturer's field repair kit.

7 4. Joints

8 a. Joint Placement

9 (1) Push on joints: Pipe shall be laid with the bell facing upstream. The gasket
10 shall be inserted and the joint surfaces cleaned and lubricated prior to
11 placement of the pipe. After joining the pipe, a metal feeler shall be used to
12 verify that the gasket is correctly located.

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

17 C. Thrust Restraint

18 1. General: Thrust restraint shall be accomplished by the use of mechanical restraining
19 devices unless specifically identified otherwise on the Drawings or herein.

20 2. Length of Restrained Joints: In accordance with the lengths listed in the table as
21 shown on the Drawings.

22 D. Installation of Pipes on Curves

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

25 3.02 CLEANING AND FIELD TESTING

26 A. General: At the conclusion of the Work, the Contractor shall provide all associated
27 cleaning and field testing as specified in other related sections of these specifications.
28

29 END OF SECTION

1 **SECTION 15064**

2 **POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS**

3 **PART 1 - GENERAL**

4 1.01 DESCRIPTION

5 A. Scope of Work: Furnish all labor, materials, equipment and incidentals required and
6 install and test all polyvinyl chloride (PVC) piping, fittings and appurtenances as shown
7 on the Drawings and specified herein.

8 B. General Design: The equipment and materials specified herein are intended to be
9 standard types of PVC pipe and ductile iron fittings for use in transporting wastewater,
10 reclaimed water, and water.

11 1.02 QUALITY ASSURANCE

12 A. Qualifications: All of the PVC pipe and ductile iron fittings shall be furnished by
13 manufacturers who are fully experienced, reputable, and qualified in the manufacture of
14 the materials to be furnished. The pipe and fittings shall be designed, constructed,
15 installed in accordance with the best practices and methods and shall comply with these
16 specifications as applicable.

17 B. Standards:

- 18 1. AWWA C900/C905
19 2. ASTM D1784 / D1785 / D2241 / D2466 / D2564 / D2729 / D2774 / D3034 / D3139 /
20 D3212
21 3. NSF 14
22 4. UNI-B-1 through 5

23 C. Factory Tests: The manufacturer shall perform the factory tests described in Section 3 -
24 AWWA C900/C905.

25 D. Quality Control:

- 26 1. The manufacturer shall establish the necessary quality control and inspection practice
27 to ensure compliance with the referenced standards.
28 2. In addition to the manufacturer's quality control procedures, the County may select an
29 independent testing laboratory to inspect the material at the production facility for
30 compliance with these specifications. The County will pay for the cost of facility
31 inspection requested by the County.

1 1.03 SHOP DRAWINGS AND SUBMITTALS

2 A. Submittals shall be submitted to the County/Professional for review and acceptance prior
3 to construction in accordance with the General Conditions and specifications Section
4 01300 "Submittals."

5 B. Materials and Shop Drawings

6 C. Manufacturer's Certification

7 1. Submit sworn certification of factory tests and their results.

8 1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

9 A. Delivery and Storage: Delivery and storage of the materials shall be in accordance with
10 the manufacturer's recommendations. PVC pipe shall be covered with black plastic with
11 a minimum thickness of 15-mil. Joint gaskets shall be stored in a clean, dark and dry
12 location until use.

13 B. Handling: Care shall be taken in loading, transporting and unloading to prevent damage
14 to the pipe or fittings and their respective coatings. Pipe or fittings shall not be rolled off
15 the carrier or dropped. Pipe shall be unloaded by lifting with a forklift or crane. All pipe
16 or fittings shall be examined before installation and no piece shall be installed which is
17 found to be defective. Pipe shall be handled to prevent damage to the pipe or coating.
18 Accidental damage to pipe or coating shall be repaired to the satisfaction of County or it
19 shall be removed from the job. When not being handled, the pipe shall be supported on
20 timber cradles or on level ground, graded to eliminate all rock points and to provide
21 uniform support along the full pipe length. When being transported, the pipe shall be
22 supported at all times in a manner to prevent distortion or damage to the lining or coating.
23 Any unit of pipe that, in the opinion of the County, is damaged beyond repair by the
24 Contractor shall be removed from the site.

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

31 **PART 2 - PRODUCTS**

32 2.01 GENERAL

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

1 2.02 MATERIALS

2 A. Polyvinyl Chloride (PVC) Pipe

- 3 1. Standards: AWWA C900/C905 and ASTM D1784/D3034/F679 (Gravity Sewer)
- 4 2. Compounds: Class 12454-A or Class 12454-B
- 5 3. PVC Gravity Pipe and Fittings: PVC gravity pipe (6-inch to 15-inch), shall conform to
- 6 ASTM D3034, maximum SDR 35. PVC gravity pipe (18-inch to 36-inch), shall
- 7 conform to ASTM F679 and uniform minimum "pipe stiffness" at 5% (percent)
- 8 deflection shall be 46-psi. The joints shall be integral bell elastomeric gasket joints
- 9 manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI
- 10 Bell Plastic Pipe Association standard is UNI B.
- 11 4. PVC Pressure Pipe and Fittings: All PVC pipe of nominal diameter 4 to 12-inches
- 12 shall be manufactured in accordance with AWWA Standard C900 and greater than
- 13 12-inches shall be manufactured in accordance with AWWA Standard C905. The
- 14 PVC pipe shall have a minimum working pressure rating of 100-psi and shall have a
- 15 maximum dimension ratio of 18. Pipe shall be the same outside diameter as ductile
- 16 iron pipe.
- 17 5. Dimension Ratio/Thickness: (unless otherwise shown on the Drawings)
- 18 a. Raw Wastewater:
- 19 (1) Pressure Systems: DR 18
- 20 (2) Gravity Systems: DR 35 (ASTM D3034) or PS 46 (ASTM F679)
- 21 b. Treated Wastewater: DR 18
- 22 c. Reclaimed Water: DR 18
- 23 d. Raw Water: DR 18
- 24 e. Potable Water: DR 18
- 25 f. Irrigation Piping: Schedule 40 or SDR 21
- 26 6. Joints:
- 27 a. Push-on integral bell elastomeric gasket joints:
- 28 (1) Standards: ASTM D3212/D3139/F477 and UNI-B-1
- 29 (2) Gaskets:
- 30 (a) Potable and Reclaimed Water Service: Styrene Butadiene Rubber (SBR)
- 31 ring type.
- 32 (b) Wastewater Service: Neoprene rubber ring type.
- 33 (3) Pipe Markings: Pipes shall have a manufacturer's home-mark on the spigot.
- 34 On field cut pipe, the Contractor shall provide home-mark on the spigot in
- 35 accordance with manufacturer's recommendations.
- 36 b. Solvent weld (nominal diameter less than 4-inches):
- 37 (1) Standards: ASTM D2466/D2564
- 38 (2) Type: Slip Fitting Socket (tapered)
- 39 (3) Exclusions: Plastic saddle and flange joints will not be used.
- 40 c. Restrained Joints:
- 41 (1) Restrained joint devices shall be made specifically for PVC pipe and meet or
- 42 exceed the requirements in ASTM F-1674.
- 43 (2) Manufacturers: Uni-flange mechanical joint restraints and bell restraints (for
- 44 all sizes); Meg-a-lug system as manufactured by EBBA Iron (sizes 12-inches
- 45 or less), or acceptable equal.
- 46 (3) Design pressure rating equal to or above test pressure as specified herein.

- 1 d. Pipe Length:
2 (1) Pressure systems: 20-foot maximum nominal length
3 (2) Gravity systems: 13-foot minimum nominal length
- 4 B. Fittings - Pressure Systems (nominal diameter 4-inches and greater):
5 1. Materials: Ductile iron
6 2. Joints: Mechanical Joint, Minimum 350-psi pressure rating
7 3. Gaskets:
8 a. Water and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) ring type
9 b. Wastewater Service: Neoprene rubber ring type
10 4. Exclusions: Standard double bell couplings will not be acceptable where the pipe will
11 slip completely through the coupling.
12 5. All fittings shall conform to either ANSI/AWWA C110/A21.10 and/or C153/A21.53,
13 latest revision, and shall be ductile iron.
14 6. All fittings shall have a date code cast (not printed or labeled), with identification of
15 the date, factory and unit at which it was cast and machined. Fittings shall have
16 distinctly cast on them the pressure rating, nominal diameter of openings,
17 manufacturer's name, the country where cast, and deflection angle. Ductile iron
18 fittings shall have the letters "DI" or "Ductile" cast on them.
19 7. All potable water main fittings shall have NSF certification and ISO 9001
20 certification for both the foundry and manufacturer. The NSF 61 certification shall be
21 issued on all coatings and linings, from the said manufacturers that are used for
22 potable water applications.
23 8. All ductile iron fittings shall have exterior coatings, including markings and colors, and
24 interior linings in conformance with Section 15062 "Ductile Iron Pipe and Fittings."
- 25 C. Fittings - Pressure Systems (nominal diameter less than 4-inches)
26 1. Material: Polyvinyl Chloride (PVC)
27 2. Joints: Slip fitting tapered socket with solvent weld
28 3. Solvent: Sure Guard 12 or acceptable equal
29 4. Exclusions: Plastic saddle and flange joint fittings shall not be used

30 2.03 LOCATION MARKERS, LOCATION WIRE AND IDENTIFICATION MARKINGS

- 31 A. Electronic Markers and Locator System (for reclaimed water and wastewater ONLY)
32 1. Markers: Markers shall consist of a passive device capable of reflecting a specifically
33 designated repulse frequency tuned to the utility (service) being installed. Markers
34 shall be color coded in accordance with the American Public Works Association's
35 "Utility Locating and Coordinating Council Standards." Colors shall be: Wastewater
36 and Reclaimed Water - #1404 Green. Markers shall be full range. Markers shall be
37 installed directly above the centerline of the respective pipeline at intervals not to
38 exceed 100-feet, at each fitting (tees, wyes, crosses, reducers, plugs, caps and bends)
39 or change in horizontal direction and at each valve along the pipeline. Markers shall
40 be hand backfilled to 1-foot above the pad and have a finished depth of burial of not
41 less than 2-feet or more than 6-feet. No separate payment shall be made for
42 furnishing and installing the respective frequency and color-coded electronic pad type
43 marker.

- 1 2. Locator System: Marker locator set shall be the 3M Dynatel 1420 or 3M Dynatel
2 1420E Electronic Marker System Marker Locator, or acceptable equal. The
3 Contractor shall furnish 1 locator set for each type of service piping installed on the
4 Project (i.e.: reclaimed water, wastewater.) to the County. Each unit shall incorporate
5 the following features and accessories:
6 a. Unit(s) shall be tuned to the proper frequency for each type (service) of piping.
7 b. Field strength meter that provides visual indication of the return signal
8 c. Function switch for selection of operation mode
9 d. Sensitivity control to adjust the receiver gain
10 e. Audio speaker for signal response
11 f. Battery access panel containing condensed operating instructions
12 g. Auxiliary headset and heads set jack
13 h. Permanently attached shoulder straps
14 i. Rugged shockproof and weatherproof storage/carrying case
15 3. Manufacturer: System shall be Scotch Mark Locator System, or acceptable equal.

16 B. Location Detection Wire

- 17 1. Materials: Continuous, insulated 10-gauge copper wire (color to match pipe
18 identification).
19 2. Installation: Directly above (1-inch maximum) centerline of pipe terminating at top of
20 each valve box collar and be capable of extending 18-inches above top of box (stored
21 inside the 2-inch brass pipe through the valve box collar) in a manner so as not to
22 interfere with valve operation. For direction drilling installations, a minimum of 2
23 (two) 10-gauge wires shall be pulled along with the pipe.

24 C. Identification Markings:

- 25 1. Pipe furnished in solid color or white with color lettering as indicated below.
26 a. Lettering along top 90° (degrees) of pipe, minimum 3/4-inch in height with
27 appropriate wording appearing 1 or more times every 21-inches along the entire
28 length of the pipeline.
29 (1) Raw Wastewater: Safety Green
30 (2) Reclaimed Water: Purple (Pantone 522C)
31 (3) Potable Water: Safety Blue

32 **PART 3 - EXECUTION**

33 3.01 INSTALLATION

34 A. Standards: AWWA C900/C905/UNI-B 3 and 4

35 B. Underground Polyvinyl Chloride (PVC) Pipe and Fittings

- 36 1. Bedding: Firm, dry and even bearing of suitable material. Blocking under the pipe
37 will not be permitted.
38 2. Placement/Alignment:
39 a. Installation shall be in accordance with lines and grades shown on the Drawings.
40 For pressure systems, deflection of joints shall not exceed 75% of that
41 recommended by the manufacturer.

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- b. 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 on pipe 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.
 - c. 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.
 - d. 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.
 - e. 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 color stripe and pipe text shall be viewed from the top of pipe when installed. 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.
 - f. Locating Wire: Locating wire, for electronically locating pipe after it is buried, or installed by trenchless technology shall be attached along the length of and installed with the pipe. This is applicable to all sizes and types of pressure mains. At a minimum, the tracing wire is to be attached to the pipe with nylon wire ties. The wire itself shall be 10-gauge single strand solid core copper wire with non-metallic insulation. The insulation shall be color coded for the type of pipe being installed. Continuous continuity must be maintained in the wire along the entire length of the pipe run. Permanent splices must be made in the length of the wire using wire connectors approved for underground applications as listed in the uniform electric code handbook. The coiled wire shall extend to a minimum of 12-inches above the surface and be connected to a test station box at valve locations.
 - g. PVC Pressure Pipe Installation and Training: PVC pipe shall be installed in accordance with standards set forth in the UNI-BELL "Handbook of PVC Pipe", AWWA C605, and AWWA Manual M-23. The pipe shall be laid by inserting the spigot end into the bell flush with the insertion line or as recommended by the manufacturer. At no time shall the bell spigot end be allowed to go past the "insertion line" or "homing mark" for pressure pipe applications and homing mark shall be visible.

- 1 h. Field Cutting: PVC pipe can be cut with a handsaw or power driven abrasive disc
2 making a square cut. The end shall be beveled with a beveling tool, wood rasp or
3 power sander to the same angle as provided on the factory-finished pipe. The
4 insertion line on the spigot shall be remarked to the same dimensions as the
5 factory-marked spigot.
- 6 i. All Contractor pipe crews utilizing PVC pressure pipe shall be trained on an
7 annual basis by Uni-Bell in coordination with the County and attended by the
8 manufacturer's representative of the respective approved Manufacturers in
9 Appendix D "List of Approved Products." The Uni-Bell PVC training session
10 will consist of proper handling, storage, installation, and compaction as well as
11 County requirements regarding PVC pipe and deflection. Every person handling,
12 installing or backfilling PVC pipe shall not be permitted to install County owned
13 and / or maintained pipe without training.
- 14 j. Approved manufacturers representatives (Appendix D "List of Approved
15 Products"), not present at the hosted Uni-Bell training session or individuals of
16 pipe crews not in attendance shall be trained on every project site. On-site project
17 training shall be for each manufacturer of pipe utilized on-site, per crew and per
18 project. Specifically each crewmember shall be trained on every project by every
19 pipe manufactures representative regardless of previous on-site training. Every
20 person handling, installing or backfilling PVC pipe shall not be permitted to
21 install County owned and / or maintained pipe without training.
- 22 k. PVC Gravity Pipe Installation: Gravity sewer pipe shall be installed to the homing
23 mark, no tolerance. Any noticeable separation shall be removed and reinstalled.
24 The homing mark may be disregarded to meet the maximum of 1-inch separation
25 between bell and spigot requirement. Joints:
- 26 l. Joint Placement:
- 27 (1) Push on joints: Pipe shall be laid with the bell ends facing upstream. The
28 gasket shall be inserted and the joint surfaces cleaned and lubricated prior to
29 placement of the pipe. After joining the pipe, a metal feeler shall be used to
30 verify that the gasket is correctly located.
- 31 (2) Mechanical Joints: Pipe and fittings shall be installed in accordance with the
32 "Notes on Method of Installation" under ANSI A21.11/AWWA C111. The
33 gasket shall be inserted and the joint surfaces cleaned and lubricated with
34 soapy water before tightening the bolts to the specified torque.

35 C. Thrust Restraint

- 36 1. Thrust restraint shall be accomplished by the use of mechanical restraining devices
37 unless specifically identified otherwise on the Drawings or herein.
- 38 2. Length of restrained joints shall be in accordance with the lengths listed in the table
39 as shown on the Drawings.

40 D. Installation of Pipes on Curves:

- 41 1. No joint deflection or pipe bending is allowed in PVC pipe. The maximum allowable
42 tolerance in the joint due to variances in installation is 0.75° (degrees) (3-inches per
43 joint per 20-foot stick of pipe). No bending tolerance in the pipe barrel shall be
44 acceptable. Alignment change shall be made only with sleeves and fittings.

1 3.02 CLEANING AND FIELD TESTING

2 A. At the conclusion of the Work, the Contractor shall provide all associated cleaning and
3 field testing as specified in associated sections of these specifications.
4

5 END OF SECTION

- 1 3. Finished surfaces of all exposed openings shall be protected by wooden blanks,
2 strongly built and securely bolted thereto.
- 3 4. Finished iron or steel surfaces not painted shall be properly protected to prevent rust
4 and corrosion.
- 5 5. After hydrostatic or other tests, all entrapped water shall be drained prior to shipment,
6 and proper care shall be taken to protect parts from the entrance of water during
7 shipment, storage, and handling.
- 8 6. Each box or package shall be properly marked to show its net weight in addition to its
9 contents.

10 B. Storage

- 11 1. Store valves and accessories in an area on the construction site protected from
12 weather, moisture, or possible damage.
- 13 2. Do not store valves or accessories directly on the ground.

14 C. Handling

- 15 1. Handle valves and accessories to prevent damage of any nature.
- 16 2. Carefully inspect all materials for:
 - 17 a. Defects in workmanship and materials.
 - 18 b. Removal of debris and foreign material in valve openings and seats.
 - 19 c. Proper functioning of all operating mechanisms.
 - 20 d. Tightness of all nuts and bolts.

21 1.05 WARRANTY AND GUARANTEES

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

1 **PART 2 - PRODUCTS**

2 2.01 GENERAL

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

5 2.02 MATERIALS

6 A. Gate valves shall be resilient seat gate valves, manufactured to meet or exceed the
7 requirements of AWWA C509/C515, latest revision, and these Specifications. All valves
8 are to be tested in strict accordance with AWWA C509/C515.

9 B. Valves shall have an unobstructed waterway equal to or greater than the full nominal
10 diameter of the valve.

11 C. The minimum design working water pressure shall be minimum 250-psig.

12 D. Gate valves shall be installed vertically per the Drawings and with minimum depth of
13 cover per Table 15111-1.
14

**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		

15 E. Valves 16-inches and larger shall be AWWA C515 resilient seated only (16-inches
16 through 24-inches no gearing required).

17 F. The valve body, bonnet, and bonnet cover shall be cast iron ASTM A126, Class B for
18 C509 valves and ductile iron ASTM A536 for C515 valves. All ferrous surfaces inside
19 and outside shall have a fusion-bonded epoxy coating in accordance with AWWA C 550.

20 G. A 2-inch wrench nut shall be provided for operating the valve. Valves 30-inches and
21 larger shall be provide with spur gear actuators. Side actuated gate valves are not
22 acceptable. All valves shall open left or counter clockwise.

23 H. The valves shall have non-rising stems with the stem made of cast, forged, or rolled
24 bronze as specified in AWWA C509. Two (2) stem seals shall be provided and shall be
25 of the O-ring type. The stem nut must be independent of the gate.

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

7 **PART 3 - EXECUTION**

8 3.01 PREPARATION

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

15 3.02 INSTALLATION

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

1 3.03 INSPECTION AND TESTING

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

3 B. Test valves for leakage at the same time that connecting pipelines are tested. See Section
4 02660 "Potable Water Distribution Piping" for pressure testing requirements. Protect or
5 isolate any parts of valves, operators, or control and instrument systems whose pressure
6 rating is less than the pressure tests.
7

8 END OF SECTION

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APPENDIX C

ORANGE COUNTY UTILITIES

PERMITS OBTAINED BY COUNTY

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APPENDIX D

ORANGE COUNTY UTILITIES Standards and Construction Specification Manual

LIST OF APPROVED PRODUCTS

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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 Series N69			4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	
EnduraShield Series73	2.0 - 3.0 mils		EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils		
PPG / Ameron	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils		
	Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils		
	Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils		

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
			Sure Stop 350 Gasket	Gasket	Sure Stop 350 Gasket	Gasket	NA	NA
		McWane Inc. DI Pipe Group	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
			Field Lok 350 Gasket	Gasket	Field Lok 350 Gasket	Gasket	NA	NA
		US Pipe	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.						
		Certainteed 4" to 12"	Certa-Lok C900/RJ	Blue	Certa-Lok C900/RJ	Pantone Purple	Certa-Lok C900/RJ	Green
		Diamond Plastics Corp	C-900	Blue	C-900	Pantone Purple	Diamond C900	Green
		Ipex Inc	C-900 Blue Brute	Blue	C-900	Pantone Purple	C900 Blue Brute	Green
		JM Eagle	C-900	Blue	C-900	Pantone Purple	C-900	Green
		National Pipe & Plastics Inc	C-900 Dura- Blue	Blue	C-900	Pantone Purple	C-900 Pipe	Green
		North American Pipe Corp (NAPCO)	C-900	Blue	C-900	Pantone Purple	C-900	Green
		Sanderson Pipe Corp	C-900	Blue	C-900	Pantone Purple	C-900	Green
	PVC C905 DR 18 Bell & Spigot 16" and Larger	C905 Bell & Spigot PVC Pipe 16" and Larger: AWWA C-905, Minimum DR18 for all Force Mains up to 24". Minimum DR21/DR25 for 30" and greater. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.						
		Certainteed 16"	NA	NA	NA	NA	Certa-Lok C905/RJ	NA
		Diamond Plastics Corp	NA	NA	NA	NA	Trans-21 DR18	Green
		Ipex Inc	NA	NA	NA	NA	IPEX Centurion	Green
		JM Eagle	NA	NA	NA	NA	C905 Big Blue	Green
National Pipe & Plastics Inc		NA	NA	NA	NA	C905	Green	
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

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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	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

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	

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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	

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					

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LIST OF APPROVED PRODUCTS - GRAVITY SYSTEMS

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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			

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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	

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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		
	Jointing Material	Jointing Material Min. 2" width for all products to ensure squeeze out with manufacturer approved primer.							
		Henry Company	NA	NA	NA	NA	Ram-Nek	with Primer	
		Martin Asphalt Company	NA	NA	NA	NA	Evergrip 990	with Primer	
		Trelleborg Pipe Seals	NA	NA	NA	NA	NPC – Bidco C-56	with Primer	
	Pipe Seals Gravity	Resilient Connector Pipe Seals, Manhole - Gravity less than 12-inch and less than 15-ft deep							
		Atlantic Concrete	NA	NA	NA	NA	A-Lok (cast-in-place)		
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal (cast-in-place)		
		IPS	NA	NA	NA	NA	Wedge Style		
		NPC	NA	NA	NA	NA	Kor-N-Seal Model WS		
		Press seal gasket	NA	NA	NA	NA	PSX Direct Drive		
	Pipe Seals Gravity	Cast in Place Pipe Seals, Manhole - Gravity Greater Than or Equal to 12-inch and all pipe sizes greater than 15-ft deep							
		Atlantic Concrete	NA	NA	NA	NA	A-Lok	cast in place	
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal	cast in place	
	FM Pipe Seals	Modular Pipe Seals for Wet Well and Valve Box penetrations and all forcemain connections to existing and new precast concrete structures. EPDM Rubber with 316 SS Hardware							
		CCI Pipeline Systems	NA	NA	NA	NA	Wrap-It Link WL-SS Series		
		Pipeline Seal & Insulator, Inc / Link Seal	NA	NA	NA	NA	Link-Seal S-316 Modular Seal		
		Proco Products, Inc	NA	NA	NA	NA	PenSeal ES-PS Series		

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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 D99100 Fill and Mount Charge		
	Winter Gauges	NA	NA	NA	NA	PFQ770 0-60 PSI D70950 top D70954 Bottom		
Pumps	Submersible Pumps							
	ABS	NA	NA	NA	NA			
	Flygt	NA	NA	NA	NA			

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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	
	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				

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