SECTION 01001

GENERAL WORK REQUIREMENTS

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This Contract comprises the installation of new potable and reclaimed water meters, removal and replacement of existing water and reclaimed water meters, and replacement of existing meter boxes.

B. The County shall provide the meters, fittings (other than schedule 40), polyethylene tubing, and closed bottom boxes

C. The contractor shall provide schedule 40 PVC pipe and fittings to complete the connections after setting the meters.

D. Work shall include work order management and data deliverables as described herein.

1.02 TERM CONTRACT

A. The Contract is a term contract that shall commence on the date of award and terminate 12 months after the award date. The option to renew is as specified in the general terms and conditions of this contract.

B. The Contract is a Unit Price contract with the total estimated base bid equal to the sum of the pay item totals from the bid schedule.

C. Projects will be authorized by issuance of a numbered delivery order. The delivery order will specify the location, description and completion time for the Project. Delivery orders will be emailed and mailed to the Contractor. The emailed copy of the delivery order shall be official Notice to Proceed. The County and the Contractor will agree on a schedule to achieve the agreed upon completion date.

1.03 METHOD OF ORDERING

A. The County will initiate a Work Order for work to be performed against this contract..

B. The County will issue Delivery Orders for work at multiple sites.

C. After the Delivery order has been sent the County will coordinate the work with the Contractor. Coordination will include but not limited to, job location, work order numbers, work description, and completion due date

D. The Contractor shall track all work in conformance with the County Maximo Computerized Maintenance Management System and submit required data in a format

compatible for import into Maximo as described herein.

E. Payment will not be made until work order data is submitted and accepted by the County

1.04 WORK TO BE DONE

A. The Contractor shall furnish all labor, materials, equipment, tools, services, and incidentals to complete all work required by these specifications and as shown on the Drawings, at a rate of progress which will ensure completion of the Work within the Contract Time stipulated.

B. The Contractor shall perform the Work complete, in place, and ready for continuous service, and shall include repairs, testing, permits, clean up, replacements, and restoration required as a result of damages caused during this construction.

C. The Contractor shall comply with all City, County, State, Federal, and other codes, which are applicable to the proposed Work.

D. All newly constructed Work shall be carefully protected from injury and or damage. No wheeling, walking, or placing of heavy loads on it shall be allowed and all portions damaged shall be reconstructed by the Contractor at his own expense.

E. Contractor shall follow procedures described in the Standard Operating Procedures included as Appendix A.

F. Contractor shall submit forms in accordance with the Meter Installation Form included as Appendix B.

G. Scope of Work: See Section 01010 "Summary of Work" and the Bid Schedule for details.

1.05 DRAWINGS AND PROJECT MANUAL

A. The Work shall be performed in accordance with the Drawings and Specifications prepared by the County/Professional. All work and materials shall conform to the Orange County Utilities Standards and Construction Specifications Manual, latest edition or as indicated in these Specifications or Drawings.

B. The Contractor shall verify all dimensions, quantities and details shown on the Drawings, Supplementary Drawings, Schedules, Specifications or other data received from the County/Professional, and shall notify same, in writing, of all errors, omissions, conflicts and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory Work, faulty construction or improper operation resulting there from, nor from rectifying such conditions at his own expense.

C. All schedules are given for the convenience of the County and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quantity of materials and equipment included in the Work to

be done under this Contract.

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

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

1.06 NOTIFICATION

A. Prior to installation the Contractor shall notify customers in person. If customer is not available, proceed with the Work.

B. Upon completion of the Work, the Contractor shall fill out the County provided door hanger and hand it to the customer, or leave it on the door if customer is not available.

C. If there are any issues that arise or anything out of the ordinary the Contractor shall immediately contact the designated County representative.

1.07 PROTECTION AND RESTORATION

A. The Contractor shall be responsible for the preservation of all public and private property, and shall use every means of protection necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the Work on the part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal to or better, but no less than existed before the damage was done, or the Contractor shall make good the damage in other manner acceptable to the County/Professional.

B. Protection of Trees and Shrubs
   1. Protect with boxes or other barricades.
   2. Do not place excavated material so as to injure trees or shrubs.
   3. Install pipelines in short tunnels between and under root systems.
   4. Support trees to prevent root disturbance during nearby excavation.

C. Tree and Limb Removal

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

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

E. Lawn Areas: All lawn areas disturbed by construction shall be replaced with like kind to a condition similar or equal to that existing before construction. Where sod is to be removed, it shall be carefully removed, and the same re-sodded, or the area where sod has been removed shall be restored with new sod in the manner described in section 02578, Solid Sodding.

F. Where fencing, walls, shrubbery, grass strips or area must be removed or damaged incident to the construction operation, the Contractor shall, after completion of the work, replace or restore to the original condition.

G. The cost of all labor, materials, equipment, and work for restoration shall be deemed included in the appropriate Contract Item or items, or if no specific item is provided therefore, as part of the overhead cost of the Work, and no additional payment will be made therefore.

1.08 HOURS OF WORK

A. The Contractor shall perform work between the hours of 7:00 am and 5:00 pm, Monday thru Friday with the exception of any County recognized holidays.

1.09 PUBLIC NUISANCE

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

B. Sound levels measured by the County/Professional shall not exceed 45 dBA from 8 p.m. to 8 a.m. or 55 dBA 8 a.m. to 8 p.m. This sound level shall be measured at the exterior of the nearest exterior wall of the nearest residence. Levels at the equipment shall not exceed 85 dBA at any time. Sound levels in excess of these values are sufficient cause to have the Work halted until equipment can be quieted to these levels. Work stoppage by the County/Professional for excessive noise shall not relieve the Contractor of the other portions of this specification including, but not limited to, completion dates and bid amounts.

C. No extra charge may be made for time lost due to work stoppage resulting from the

creation of a public nuisance.

1.10 CONTRACTOR'S PAYMENTS TO COUNTY FOR OVERTIME WORK

A. **County Inspector Work Hours: Normal work hours for the County's inspector(s) a hours are 7:00 a.m. and 5:00 p.m. on the weekdays of Monday through Friday. Any County Inspector(s) work beyond the aforementioned normal work hours shall be requested in writing 48-hours in advance. All overtime, any County holidays or weekend work compensation for the County's Inspector(s) to work beyond the normal working hours are considered overtime compensation and shall be paid for by the Contractor. The overtime pay rate will be $51.00 per hour or the most current rate as listed in the County Fee Directory prepared by the Office of Management and Budget, in section "Orange County Utilities Engineering & Construction", under the heading of "Inspection Fee other than Normal Working Hours". The Contractor agrees that the County shall deduct charges for work outside normal work hours and for overtime pay from payments due the Contractor**.

B. The County will determine if an inspector will need to be onsite during the timeframe listed in the request.

1.11 MAINTENANCE OF SERVICE

A. Except as noted herein, during execution of the Work, water service and reclaimed water service may be disrupted for a period of up to 1 hour. Contractor shall make every effort to minimize the service disruption to the shortest possible duration.

B. If the execution of the work results in a failure resulting in loss of service to the property or the distribution system, the Contractor shall notify the Orange County Utilities Dispatch immediately.

C. If the Contractor encounters a service that has been locked, no work shall be performed and the information shall be noted in the work order.

D. Utility lines that are damaged during construction shall be repaired by the Contractor and service restored within 4-hours of the breakage. The County retains the option of repairing any damage to utility pipes in order to expedite service to the customers. If the County exercises their option to repair the damage(s) then the Contractor shall be responsible for all costs associated with the repair.

E. If debris caused by the Contractors work should pass through to the internal piping of the structure work is being performed at, the Contractor shall be responsible for all costs associated with removing said debris. Examples, but not limited to, clogged water treatment systems, toilet, shower heads, filters, faucets.

F. If during the re-establishment, of water or reclaimed water service, the Contractor damages private property, it will be the responsibility of the Contract to fix the damage using a Certified Professional if one is not in the employ of the Contractor.

1.12 UNAUTHORIZED CONNECTIONS OR UNUSUAL FINDINGS

A. The Contractor shall notify Orange County Utilities Field Services Center when any unauthorized connections or other unusual findings are discovered during the work.

B. The Contractor shall submit an email to UD-FSC@ocfl.net with property address, description of discovered issue and photograph immediately upon discovery.

C. The Contractor shall also note such discoveries in the submitted work order data.

1.13 LABOR

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

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

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

1.14 DELIVERABLES

A. All data shall be delivered in an Excel spreadsheet or Access database file. The file shall contain the required Maximo fields. The spreadsheet or database, populated with the required Maximo field names, shall be submitted to the County for approval prior to Work.

B. Maximo fields shall be populated with valid codes/descriptions as provided by the County.

C. The Contractor shall submit the following data for each meter installation and/or replacement. Work order data submittals shall be made daily or more frequently.

1. Work Order Data – Meter Replacement
    a. Work Order Number
    b. Property Address
    c. Date of Installation
    d. Existing (removed) Meter Number

e. Existing (removed) Meter Final Reading. If meter is unreadable, Contractor shall break lens to acquire reading
f. New (installed) Meter Number
g. New (installed) Meter Initial Reading
h. New (installed) Backflow Preventer Make/Model and Serial Number
i. Notes regarding missing meters, unauthorized connections and other unusual field observations

2. Work Order Data – New Meter Installation
   a. Work Order Number
   b. Property Address
   c. Date of Installation
   d. Backflow Device Make/Model and Serial Number
   e. New Meter Number
   f. New Meter Reading
   g. Location of Meter

D. The following photographs are to be taken at all installations and provided to the County upon request. The contractor shall name each photo file with the property address and use a gps enable camera with an accuracy of ± 10 feet.

a. Photograph of meter vault and meter(s) clearly depicting meter identification number and meter reading. Photograph shall also include a white dry erase board labeled with the property address for each meter.
b. Photograph of any unauthorized connections or other unusual field observations (with white dry erase board notating property address)

E. Failure to provide required data deliverables will result in non-payment for the meter installation or replacement

F. Contractor shall deliver all removed meters to the County at 8100 Presidents Drive, Orlando, Florida 32809, at minimum, weekly. Failure to deliver removed meters will be cause for non-payment.

1. The County will specify a contact person at post award meeting.

1.15 MATERIALS AND EQUIPMENT

A. MANUFACTURER

1. Meters, meter boxes, and dual check valves (for new installations) will be provided by the County. All other materials, including piping and fittings to connect to the water service and property services, and equipment necessary for complete installation shall be provided by the Contractor.
2. All workmanship and materials shall be of the highest quality. The equipment shall be the product of manufacturers who are experienced and skilled in the field with an established record of research and development. No equipment will be considered unless the manufacturer has designed and manufactured equipment of comparable type and size and have demonstrated sufficient experience in such design and manufacture.
3. No material shall be delivered to the Site without prior approval of the

County/Professional.

4. All apparatus, mechanisms, equipment, machinery, and manufactured articles for incorporation into the Project shall be the new (most current production at time of bid) and unused standard products of recognized reputable manufacturers.
5. Manufactured and fabricated products:
    a. Design, fabricate and assemble in accord with the best engineering and shop practices.
    b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
    c. Any two or more pieces of material or equipment of the same kind, type or classification, and being used for identical types of service, shall be made by the same manufacturer.
    d. Products shall be suitable for service conditions as specified and as stated by manufacturer.
    e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
    f. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.16 INSPECTION AND TESTING

A. General

1. All materials and equipment furnished by the Contractor shall be subject to the inspection, review and acceptance of the County and meet the requirements as outlined in the Orange County Utilities Standards and Construction Specifications Manual. If in the testing of any material or equipment it is ascertained by the County/Professional that the material or equipment does not comply with the Contract, the Contractor shall be notified thereof, and the Contractor will be directed to refrain from delivering said material or equipment, or to remove it promptly from the Site or from the Work and not accepted by the County shall be replaced with acceptable material, without cost to the County.
2. Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEE, except as may otherwise be stated herein.
3. The Contractor shall give notice in writing to the County sufficiently in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the County shall arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials; or the County will notify the Contractor that the inspection will be made at a point other than the point of manufacture; or the County will notify the Contractor that inspection will be waived.
4. When inspection is waived or when the County/Professional so requires, the Contractor shall furnish to the County authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the Work have been manufactured and tested in conformity with the Contract Documents. These

certificates shall be notarized and shall include five (5) copies of the results of physical tests and chemical analysis, where necessary, that have been made directly on the product or on similar products of the manufacturer.

5. The Contractor must comply with these provisions before shipping any material. Such inspections by the County shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

B. Cost
   1. County shall employ and pay for the services of an independent testing laboratory to perform testing indicated on the Contract Documents, or at the County's discretion to ensure conformity with the Contract Documents.
   2. The cost of field leakage and pressure tests and shop tests of materials and equipment specifically called for in the Contract Documents shall be borne by the Contractor. Such costs shall be deemed to be included in the Contract price.
   3. The Contractor shall notify the County laboratory a minimum of 48-hours in advance of operations for scheduling of tests. When tests or inspections cannot be performed after such notice, the Contractor shall reimburse County for expenses incurred.
   4. The Contractor shall pay for all work required to uncover, remove, replace, retest, etc., any work not tested due to the Contractor's failure to provide the 48-hours advance notice or due to failed tests. The Contractor shall also provide compensation for the County/Professional's personnel for required re-testing due to failed or rescheduled testing.

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

D. Field Testing:
   1. The County shall employ and pay for services of an independent testing laboratory to perform testing specifically indicated in the Contract Documents. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract. The Contractor shall provide compensation for retesting of all failed tests.
   2. The County may at any time during the progress of the Work, request additional testing beyond that which is specified in the Contract. This testing will be at the County's expense. Contractor shall:

a. Cooperate with laboratory personnel, provide access to the Project.
b. Secure and deliver to the laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.
c. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes, which require control by the testing laboratory.

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

F. Final Inspection: Prior to preparation of the final payment application, a final inspection will be performed by the County to determine if the Work is properly and satisfactorily constructed in accordance with the requirements of the Contract Documents.

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

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

1.17 PROJECT SITE AND ACCESS

A. RIGHT-OF-WAY AND EASEMENTS

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

possible so as to allow the completion of the Work within the Contract time.

B. ACCESS

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

1.18 UTILITIES

A. UTILITY CONSTRUCTION

1. Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto, whether owned or controlled by governmental bodies or privately owned by individuals, firms or corporations, used to serve the public with transportation, traffic control, gas, electricity, telephone, sewerage, drainage or water. Other public or private property, which may be affected by the Work, shall be deemed included hereunder.
2. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required.
3. The length of open trench will be controlled by the particular surrounding conditions, but shall always be confined to the limits described by the County. If any excavation becomes a hazard, or if it excessively restricts traffic at any point, the County may require special construction procedures. As a minimum, the Contractor shall conform to the following restoration procedures:
    a. Interim Restoration: All excavations shall be backfilled and compacted as specified by the end of each working day. For excavations within existing paved areas; limerock base or soil cement base (match existing) shall be spread and compacted to provide a relatively smooth surface free of loose aggregate material. At the end of each workweek, the S-I asphaltic surface course shall be completed and opened to traffic. The Contractor shall coordinate his construction activity including density tests and inspections to allow sufficient time to achieve this requirement. All driveway cuts shall be backfilled, compacted, and limerock base spread and compacted immediately after installation. Contractor shall coordinate with the individual property owners prior to removing the driveway section. Any utility crossing an existing roadway, parking lot or other paved area shall be patched by the end of the working day.

b. All pipe and fittings shall be neatly stored in a location, which will cause the least disturbance to the public. All debris shall be removed and properly disposed of by the end of each working day.
c. Final Restoration Overlay: After completing all installations, and after testing of the pipe (but no sooner than 30-days after applying the S-I asphaltic surface), final restoration shall be performed. In no event shall final restoration begin after substantial completion. Final restoration shall provide for base and asphaltic overlay as specified by the requirements of the Florida Department of Transportation permit issuer or the Public Works Utilization of Right of Way specifications, in an uninterrupted continuous operation until completion. Any additional restoration required after testing shall be repaired in a timely manner at no additional cost to the County.
d. Maintenance of all restored facilities shall be the Contractor's responsibility. This maintenance shall be performed on an on-going basis during the course of construction. The Contractor's Progress Schedule shall reflect the above restoration requirements.
e. Additional Restoration for Work in Business or Commercial Districts: The Contractor shall restore all private property, damaged by construction, to its original condition. Access to businesses located adjacent to the project site must be maintained at all times. Contractor may prearrange the closing of business accesses with the business owner. Such prearranged access closing shall not exceed two (2) hours. Property drainage and grading shall be restored within 24-hours of backfilling trench.

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

any such excavation.

C. NOTICES
1. All governmental utility departments and other owners of public utilities, which may be affected by the Work, will be informed in writing by the Contractor two (2) weeks after the execution of the Contract or Contracts covering the Work. Such notice will be sent out in general, and directed to the attention of the governmental utility departments and other owners of public utilities for such installations and structures as may be affected by the Work.
2. The Contractor shall comply with Florida Statute 553.851 regarding protection of underground gas pipelines. Evidence of notification to the gas pipeline owner shall be furnished to the County immediately as needed.
3. It shall be the Contractor's responsibility to contact utility companies at least 72-hours in advance of breaking ground in any area or on any unit of the work so maintenance personnel can locate and protect facilities, if required by the utility company.
4. The Contractor shall give a minimum five (5) working day notice to utility personnel prior to interrupting a utility service (water, sewer, etc.).

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

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

adjusted by the Contractor to bring them flush with the surface of the finished work.

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

F. TRAFFIC MAINTENANCE

1. Maintain public highway traffic within the limits of the Project for the duration of the construction period, including any temporary suspensions of work. Work shall also include construction and maintenance of any necessary detour facilities; furnishing, installing and maintaining of traffic control and safety devices, control of dust, or any other special requirements for safe and expeditious movement of vehicular and pedestrian traffic.
2. Traffic Control shall be provided at the Contractor's expense by the Contractor's personnel or off-duty uniformed police officer, depending on and as required by the applicable traffic control requirements jurisdictional to the construction or road.
3. The Contractor shall prepare and submit a Maintenance of Traffic plan (MOT) to the County/Professional and to the agency with jurisdiction for MOT (Orange County Public Works, FDOT, local municipalities, etc.) for review and acceptance prior to commencing any work. The Traffic Control Plan shall detail procedures and protective measures proposed by the Contractor to provide for protection and control of traffic affected by the Work consistent with the following applicable standards:
   a. Standard Specifications for Road and Bridge Construction, Latest Edition including all subsequent supplements issued by the Florida Department of Transportation.
   b. Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations, FDOT.
   c. Right-of-Way Utilization Regulations, Orange County, Florida, latest edition. All references to the respective agency in the above referenced standards shall be construed to also include the County for this Work.
4. The Contractor will notify the public one (1) week in advance of any scheduled work via the use of portable message boards. The message boards shall be located at each approach to the construction area.
5. Before closing any thoroughfare, the Contractor shall give written notice to, and if necessary, obtain a permit or permits from the duly constituted public authority having jurisdiction over the thoroughfare. Notice shall be given no less than 72-hours in advance of the time when it may be necessary in the process of construction to close such thoroughfare, or as may be otherwise provided in the acceptable Maintenance of Traffic plan.
6. The Contractor shall sequence and plan construction operations and shall generally conduct his work in such a manner as not to unduly or unnecessarily restrict or impede existing normal traffic through the streets of the local community.
7. If required by duly constituted public authority, the Contractor shall, at his own expense, construct bridges or other temporary crossing structures over trenches so as not to unduly restrict traffic. Such structures shall be of adequate strength and proper construction and shall be maintained by the Contractor in such a manner as not to

constitute an undue traffic hazard.

8. The Contractor shall make provisions at all "open cut" street crossings to allow a minimum of one lane to be open for vehicular traffic at all times. Lane closing shall be as permitted by the local governing authority and shall be repaired to a smooth, safe driving surface immediately following the installation of pipe or conduit.
9. The Contractor shall make provisions at cross streets for the free passage of vehicles and pedestrians, either by bridging or otherwise, and shall not obstruct the sidewalks, gutters, or streets, nor prevent in any manner the flow of water in the latter, but shall use all proper and necessary means to permit the free passage of surface water along the gutters.
10. The Contractor shall immediately cart away all offensive matter; exercising such precaution as may be directed by the County. All material excavated shall be so disposed of as to inconvenience the public and adjacent tenants as little as possible and to prevent injury to trees, sidewalks, fences and adjacent property of all kinds.

G. BARRIER AND LIGHTS

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

H. DUST AND EROSION CONTROL

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

I. LINES AND GRADES

1. All meter boxes shall be installed flush with surrounding grade.

J. TEMPORARY CONSTRUCTION

1. Temporary fences: If, during the course of the Work, it is necessary to remove or

disturb any fencing, the Contractor shall at his own expense, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced.

2. Responsibility for Temporary Structures: In accepting the Contract, the Contractor assumes full responsibility for the sufficiency and safety of all temporary structures or work and for any damage which may result from their failure or their improper construction, maintenance or operation.

K. CLEANING

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

1.19 CONSTRUCTION NOT PERMITTED

A. USE OF EXPLOSIVES

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. This Contract is for meter installations as specified herein. The Work consists of furnishing all labor, equipment, and materials for the construction of the facilities consisting of, but not limited to the following:
   1. Installation of new meters and boxes.
   2. Removal of existing meters, installation of new meter, and reconnection to existing lines.
   3. Replacement of existing meter boxes only and reconnection to existing lines.

B. Equipment provided by the County:
   1. The County shall provide the meters, fittings (other than schedule 40), polyethylene tubing, and closed bottom boxes.
   2. The contractor shall provide schedule 40 PVC pipe and fittings to complete the connections after setting the meters.

C. Restoration:
   1. Area disturbed by the Contractor shall be minimized.
   2. All disturbed areas shall be graded to pre-construction conditions
   3. Contractor shall restore disturbed landscaping, including grass, around all replaced meter boxes.

1.02 CONTRACTOR'S USE OF PREMISES

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

1.03 SEQUENCE OF WORK

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

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

1.04 PUBLIC UTILITY INSTALLATIONS AND STRUCTURES

A. The Contractor shall give written notice to all governmental utility departments and other

owners of public utilities of the location of the proposed construction operations, at least seventy-two hours in advance of breaking ground in any area or on any unit of the Work.

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

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

1.02 GENERAL PROVISIONS

A. This specification includes standard descriptions for all bid items. This Contract's specific bid items are listed in the Bid Schedule.

B. The total Contract Amount shall cover the Work required by the Contract Documents. All costs in connection with the successful completion of the Work, including furnishing all materials, equipment, supplies, and appurtenances; providing all construction, equipment, and tools; and performing all necessary labor and supervision to fully complete the Work, shall be included in the unit and lump sum prices bid. All Work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of the Contractor and all costs in connection therewith shall be included in the prices bid.

C. If used, all estimated quantities stipulated in the Bid Schedule or other Contract Documents are approximate and are to be used only (a) for the purpose of comparing the bids submitted for the Work, and (b) as a basis for determining an initial Contract Amount. The actual amounts of Work completed and materials furnished under unit price items may differ from the estimated quantities. The County does not expressly or by implication represent that the actual quantities involved will correspond exactly to the quantities stated in the Bid Schedule; nor shall the Contractor plead misunderstanding or deception because of such estimate or quantities or of the character, location or other conditions pertaining to the Work. Payment to the Contractor will be made only for the actual quantities of work performed or material furnished in accordance with the Drawings and other Contract Documents, and it is understood that the quantities may be increased or decreased as provided in the General Conditions.

D. If used, the unit prices listed in the Bid Schedule shall include all services, obligations, responsibilities, labor, materials, devices, equipment, royalties and license fees, supervision, temporary facilities, construction equipment, bonds, insurance, taxes, clean up, traffic control, control surveys, field offices, close out, overhead and profit and all connections, appurtenances and any other incidental items of any kind or nature, as are necessary to complete the Work in accordance with the Contract Documents.

E. The Contractor agrees that it will make no claim for damages, anticipated profits, or otherwise because of any difference between the amounts of work actually performed and materials actually furnished and the estimated amounts therefore.

F. Where payment by scale weight is specified under certain items, the Contractor shall provide suitable weighing equipment which shall be kept in accurate adjustment at all times and certified. The weighing of all material shall be performed by the Contractor in the presence and under the supervision of the County.

G. All schedules included in the Contract Documents are given for convenience and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quantity of materials and equipment included in work to be done under this Contract.

H. Where pipe fittings are noted on the Drawings, such notation is for the Contractor's convenience and does not relieve the Contractor from laying and jointing different or additional items where required.

I.

1.03 WORK NOT PAID FOR SEPARATELY

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

B. Preparation of Site: Payment for preparation of site shall be included in pay items proposed for the various items of Work and no separate payment will be made therefore. Preparation of site includes setting up construction plant, offices, shops, storage areas, sanitary and other facilities required by the specifications or state law or regulations; providing access to the site; obtaining necessary permits and licenses; payments of fees; general protection, temporary heat and utilities including electrical power; providing shop and working drawings, certificates and schedules; providing required insurance; preconstruction photographs and videos; clearing and grubbing; removal of existing pavements, sidewalks and curbs; trench excavation, sheeting, shoring and bracing; dewatering and disposal of surplus water; structural fill, backfill, compaction and grading; testing materials and apparatus; maintenance of drainage systems; appurtenant work; record drawing and close-out documentation; cleaning up; and all other work regardless of its nature which may not be specifically referred to in a Bid Item but is necessary for the complete construction of the project set forth by the Contract.

C. Permitting & Permit Fees.

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

1.04 MEASUREMENT FOR PAYMENT

A. Methods of Measurement - Generally:
   1. Units of measurement shall be defined in general terms as follows:
      a. Linear Feet (LF)
      b. Square Feet (SF)
      c. Square Yards (SY)
      d. Cubic Yards (CY)
      e. Each (EA)
      f. Sacks (SK)
      g. Lump Sum (LS)
   2. Unit Price Contracts/Items:
      a. Linear Feet (LF) shall be measured along the horizontal length of the centerline of the installed material, unless otherwise specified. Pipe shall be measured along the length of the completed pipeline, regardless of the type of joint required, without deduction for the length of valves or fittings. Pipe included within the limits of lump sum items will not be measured.
      b. Square Feet (SF), Square Yards (SY), Cubic Yards (CY), Each (EA) and Sacks (SK) shall be measured as the amount of the unit of measure installed and compacted within the limits specified and shown in the Specifications and Drawings. Slope angles and elevations shall be measured using land-surveying equipment. Contractor shall provide supporting documentation (i.e. drawings, delivery tickets, invoices, survey calculations, etc.) to verify actual installed quantities.

B. Lump Sum Contracts/Items - Generally:
   1. Quantities provided in the Schedule of Values are for the purpose of estimating the completion status for progress payments. Payment will be made for each individual item on a percentage of completion basis as estimated by the Contractor and approved by the County.
   2. Adjustments to costs provided in the accepted Schedule of Values may be made only by Change Order.
   3. The County reserves the right to delete any item included in the Schedule of Values and decrease the Contract Price by the scheduled amount for the item deleted.

Table A

BID ITEM	MEASUREMENT AND PAYMENT ITEMS Pg 1
	10 GENERAL REQUIREMENTS
	10.1 – General
	Indemnification

1	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.
	Install New Meter and Box (single or double set, various sizes)
2-4 9-11 16-18	a. Measurement: Measurement to Install New Meter and Box shall be made per actual number of complete meter and box assemblies satisfactorily installed in accordance with the County requirements and specifications. b. Payment: Payment to Install New Meter and Box shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit prices shall be full compensation for furnishing all labor, materials not provided by Owner (refer to Specifications), and equipment to excavate, dewater, install meter(s) and box, and connect to the property service/ or leave stub out for plumber. Also included in this item are property owner notification, maintenance of traffic, required data deliverables, backfilling and compaction complete in place to finish grade of road or natural ground and surface restoration.
	Remove and Replace Existing Meter (various sizes)
5-6 12-13 19-20	a. Measurement: Measurement to Remove and Replace Existing Meter shall be made per actual number of meters satisfactorily removed and replaced in accordance with the County requirements and specifications. b. Payment: Payment to Remove and Replace Existing Meter shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit prices shall be full compensation for furnishing all labor, materials not provided by Owner (refer to Specifications), and equipment to remove the existing meter, install new meter, and connect to the house service in accordance with County Specifications and Details. Also included in this item are property owner notification, maintenance of traffic, surface restoration and required data deliverables.
	Remove and Replace Existing Meter Box (single or double)
7-8 14-15 21-22	a. Measurement: Measurement to Remove and Replace Meter Box shall be made per actual number of meter boxes satisfactorily removed and replaced in accordance with the County requirements and specifications. b. Payment: Payment to Remove and Replace Meter Box shall be made based on the authorized quantity at the unit price indicated in the Bid. Payment of the applicable Contract unit prices shall be full compensation for furnishing all labor, materials not provided by Owner (refer to Specifications), and equipment to excavate, dewater, install meter box, and connect to the existing water service and property service. Also included in this item are property owner notification, maintenance of traffic, backfilling and

	compaction complete in place to finish grade and surface restoration.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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, also known as invoicing.

B. Delivery Order(s) will be issued for work against this contract. Delivery order may be for multiple installations within the County.

C. Prior to submitting a monthly payment application, the Contractor’s work order data shall be submitted and accepted by the County. The County, upon acceptance shall, notify the Contractor that they are authorized to invoice the County

D. All payments will be made in accordance with F.S 218.70-218.80, Local Government Prompt Payment Act

1.02 PREPARATION OF APPLICATION

A. Invoices shall be mailed to the address listed in the contract documents after data submission(s) have been accepted by the County.

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

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

D. Waivers of Claims and Mechanics Lien (Waivers): With each Application for Payment the Contactor shall submit waivers of claims and mechanic liens from Subcontractors, Sub-subcontractors, and suppliers for the construction period covered by the previous application.
   1. The Contractor shall submit partial waivers on each item for the amount requested, prior to deduction for retainage, on each item.
   2. When an application shows completion of an item, the Contractor shall submit final or full waivers.
   3. The Contractor shall submit the final Application for Payment with, if not already submitted, the final waivers from every entity involved with performance of work covered by the Application that could lawfully be entitled to a payment claim or lien.
   4. Format of Waiver Forms: The Contractor shall submit executed waivers of claims and liens on forms acceptable to the County.

5. The County reserves the right to designate which entities involved in the Work must submit waivers.

E. Proper invoice: A proper invoice shall include, at minimum, the following and are in no particular order:

1. Name of vendor
2. Address of vendor (i.e., where payment is to be mailed)
3. Invoice Date
4. Delivery Order number.
5. Contract Number
6. Itemized description of the services
7. Correct quantities based on the approved data submission associated with the invoice.
8. Correct line item numbers
9. Correct Line item amounts

F. If invoices do not contain at minimum the information listed above or there are errors on the invoice, then the invoice will be considered an Improper Invoice in accordance with F.S. 218.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01070

ABBREVIATIONS AND SYMBOLS

PART 1 - GENERAL

1.01 REQUIREMENTS INCLUDED

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

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)

B. UNITS OF MEASUREMENT

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)

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

END OF SECTION

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SECTION 01091

REFERENCE SPECIFICATIONS

PART 1 - GENERAL

1.01 GENERAL

A. Applicable Publications: Whenever in these Specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the Work is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the Drawings shall be waived because of any provision of or omission from said standards or requirements.

B. Assignment of Specialists: In certain instances, specification test requires (or implies) that specific work is to be assigned to specialist or expert entities who must be engaged for the performance of the Work. Such assignments shall be recognized as special requirements over which the Contractor has no choice or option. These requirements shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the Work. They are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of Work is recognized as "expert" for the indicated construction processes or operations. Nevertheless, the final responsibility for fulfillment of the entire set of Contract requirements remains with the Contractor.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the Specifications, all Work specified herein shall conform to or exceed the requirements of such referenced documents which are not in conflict with the requirements of these Specifications or applicable codes.

B. References herein to "Building Code" shall mean the Florida Building Code. The latest edition of the code shall apply to the Work herein, including all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflict between codes, reference standards, Drawings, and the other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the Engineer for clarification and directions prior to ordering or providing any materials or labor. The Contractor shall bid the most stringent requirements.

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01101
SPECIAL
REQUIREMENTS

PART 1 - GENERAL

1.1 REQUIREMENTS

A. The Contractor shall meet these minimum qualifications for meter installation and replacement.

1.2 MINIMUM CONTRACTOR QUALIFICATIONS

A. Reference the contract front end for requirements that shall be met to qualify for the Meter Installation and Replacement Project.
   1. Company Experience
      a. Meter Installation Experience
         (1) Orange County requests a minimum of three (3) verifiable references where work of a similar size and scope has been successfully completed in the last 5 years by the bidding firm wherein they were performing as the prime or lead firm with responsibility for the management and performance of the work. Bids will be considered only from experienced and well-equipped contractors engaged in work of this type and magnitude. List similar work successfully completed within the last five years, giving the location, size, and rate of installation maintained throughout the project. The bidder shall specify the portion of the work undertaken by their firm. Reference projects shall include the following information:
            - Brief description of the work completed
            - Rate of installation maintained throughout the project
            - Contracted amount
            - Time required completing the project
            - Contact names, phone numbers, addresses and email of the referenced project contact.
         (2) Contractor shall submit company QA/QC plan and procedures

   2. Personnel Qualifications
      a. Meter Installation Personnel Qualifications
         (1) Field Supervisor or Foreman shall have served in a similar role on a minimum of two (2) successfully completed meter replacement programs within the past 5 years that included at least 250 meter replacements.
      b. Copies of licenses and certifications of all field personnel shall be submitted with the bid

1.3 SUBMITTALS

The Contractor shall submit a completed qualification form with the required information, company resume and project personnel resumes.

For the life of this contract, any new hires and/or replacements of project personnel will require the Contractor to provide updated information to Orange County to review and approve prior to them starting. Any substitution of key personnel shall be approved in writing by Orange County.

PART 2 - PRODUCTS (NOT

USED) PART 3 - EXECUTION

3.1 CONTRACT COORDINATION MEETING

A. Prior to commencing field activities, the Contractor shall attend a Coordination Meeting with the County. Contractor shall be prepared to discuss the following agenda items:
   1. Project contacts
   2. County notification procedures
   3. Public notification requirements
   4. Inspection QA/QC
   5. Deliverables
   6. Schedule

3.2 CONTRACTOR REPRESENTATIVE

A. The Contractor shall designate a project representative who will be the point of contact throughout the project.

B. The project representative shall coordinate all training with OCU staff, attend training and be responsible to have the project staff trained in OCU procedures and use of the GIS and Maximo systems.

C. The project representative shall receive and distribute work orders generated for this project and coordinate all contract work.

D. The project representative shall attend and participate in all project meetings.

E. The project representative shall, at a minimum, meet the qualifications of the project Foreman as described above.

3.3 GENERAL PROGRESSION OF WORK

A. Contractor shall submit an updated schedule of activities on a weekly basis.

B. Contractor shall notify the County a minimum of 48-hours prior to any inspection work.

C. All work shall be performed in an orderly, organized fashion, progressing through the project area(s) in a systematic manner. Contractor shall adhere to submitted and communicated schedules.

3.4 QUALITY ASSURANCE

The Contractor shall have a QA/QC plan and procedures to ensure accurate data collection, documentation and submittal.

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 - GENERAL

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

1.01 SHOP DRAWINGS AND DATA

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

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

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

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

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

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

1.02 REVIEW OF SHOP DRAWINGS AND SAMPLES

A. The County /Professional's review of Shop Drawings, Data, and Samples as submitted by the Contractor will be to determine if the items(s) generally conform(s) to the information in the Contract Documents and is/are compatible with the design concept. The County/Professional's review and exceptions, if any, will not constitute an approval of dimensions, connections, quantities, and details of the material, equipment, device, or item shown.

B. The review of drawings and schedules will be general, and shall not be construed:
   1. As permitting any departure from the Contract Documents
   2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials
   3. As approving departures from details furnished by the County/Professional, except as otherwise provided herein

C. If the drawings or schedules as submitted describe variations and show a departure from the Contract Documents which the County/Professional finds to be in the interest of the County and to be so minor as not to involve a change in Contract Price or Contract Time, the County/Professional may return the reviewed drawings without noting an exception.

D. "Approved As Noted": Contractor shall incorporate County/Professional's comments into the submittal before release to manufacturer. The Contractor shall send a letter to the County/Professional acknowledging the comments and their incorporation into the Shop Drawing.

E. "Amend and Resubmit": Contractor shall resubmit the Shop Drawing to the County/Professional. The resubmittal shall incorporate the County/Professional's comments highlighted on the Shop Drawing.

F. "Rejected": Contractor shall correct, revise and resubmit Shop Drawing for review by County/Professional.

G. Resubmittals will be handled in the same manner as first submittals. For resubmittals the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by County/Professional on previous submissions. The Contractor shall make any corrections required by the County/Professional.

H. If the Contractor considers any correction indicated on the Drawings to constitute a change to the Drawings or Specifications, the Contractor shall give written notice thereof to the County/Professional.

I. When the Shop Drawings have been completed to the satisfaction of the County/Professional, the Contractor shall carry out the Construction in accordance therewith and shall make no further changes therein except upon written instructions from the County/Professional.

J. No partial submittals will be reviewed. Submittals not deemed complete will be stamped "Rejected" and returned to the Contractor for resubmittal. Unless otherwise specifically permitted by the County/Professional, make all submittals in groups containing all associated items for:
   1. Systems
   2. Processes
   3. As indicated in specific Specifications Sections
      All drawings, schematics, manufacturer's product data, certifications, and other Shop Drawing submittals required by a system specification shall be submitted at one time as a package to facilitate interfaces checking.

K. Only the County/Professional shall utilize the color "red" in marking Shop Drawing submittals.

L. Failure to comply with any of the above may result in the rejection of Shop Drawings.

1.03 PRODUCT DATA

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

1.04 MANUFACTURERS' INSTRUCTIONS

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

1.05 SAMPLES

A. Submit full range of manufacturers' standard colors, textures and patterns for the County's selection. Submit samples for selection of finishes within 30-days after Award of Contract. All color and finish selections must be submitted by the Contractor in a single submission, properly labeled and identified.

B. Submit samples to illustrate functional characteristics of the product, with integral parts and attachment devices. Coordinate submittal of different categories for interfacing work.

C. Submit the number of samples specified in the respective Specification section, but no less than two (2). After review one (1) will be retained by the County. Reviewed samples that may be used in the Work are indicated in the Specification Section.

D. Samples shall be delivered to the County as directed. The Contractor shall prepay shipping charges on samples. Materials or equipment for which samples are required shall not be used in the Work until approved by the County/Professional.

E. Samples shall be of sufficient size to clearly illustrate:
   1. Functional characteristics of the product, with integrally related parts and attachment devices
   2. Full range of color, texture and pattern
   3. Each sample shall have a label indicating:
      a. Name of Project
      b. Name of Contractor and Subcontractor
      c. Material or equipment represented
      d. Place of origin
      e. Name of product and brand (if any)
      f. Location in Project
      g. Specification title and number
      h. Submittal number
      i. Note: Samples of finished materials shall have additional marking that will identify them under the finished schedules.

F. The Contractor shall prepare a transmittal letter, in triplicate (3) for each shipment of samples containing the information required in paragraph herein. The Contractor shall enclose a copy of this letter with the shipment and send a copy of this letter to the County/Professional. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

G. Approved samples not destroyed in testing shall be sent to the County or stored at the site of the Work. Approved samples of the hardware in good condition may be incorporated in the Work if requested in writing by the Contractor and approved in writing by the County/Professional. Samples that failed testing or were not approved will be returned to the Contractor at the Contractor's expense, if so requested at time of submission.

1.06 FIELD SAMPLES

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

1.07 DRAWINGS, PRODUCT DATA AND CERTIFICATES

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

B. The County generally will not check dimensions, quantities or schedules, except in cases where the information is lacking in the Specifications.

C. The following is applicable to submitted drawings, data and certificates:
   1. Show relation to adjacent structures or materials.
   2. Clearly identify field dimensions.
   3. Show required dimensions and clearances.
   4. Performance characteristic and capabilities shall accompany original Shop Drawing submittals.
   5. Wiring diagrams and controls shall accompany original Shop Drawing submittals.
   6. Installation instructions shall accompany original Shop Drawing submittals.
   7. Each submittal shall identify applicable Standards, such as ASTM number or Federal Specification number.
   8. All information not pertinent shall be removed from the submittal, or shall be crossed out.

D. When resubmission is required, the County/Professional will return only two (2) marked up copies. A third submission from the same manufacturer will not be accepted.

1.08 SUBSTITUTIONS

A. The substitution requirements of this Section are in addition to the requirements of the General Conditions and Supplementary Conditions.

B. When a particular product is specified or called for, it is intended and shall be understood that the proposal tendered by the Bidder includes those products in his Bid. Substitutions will only be considered in cases where original materials are unavailable or in an instance where substitute can be proven superior in its planned application

C. The intent of these specifications is to provide the County with a quality facility without discouraging competitive bidding. For products specified only by reference standards, performance and descriptive methods, without naming manufacturer's products, the Contractor may provide the products of any manufacturer complying with the Contract Documents, subject to the review of product data by the County/Professional as specified herein.

D. The County/Professional's approval is required for substitutions.

E. The Contract is based on the materials, equipment and methods described in the Contract Documents.

F. The County/Professional will consider proposals for substitution of materials equipment and methods only when such proposals are accompanied by full and complete technical data and all other information required by the County/Professional to evaluate the proposed substitution.

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

1.09 OPERATING MANUALS

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

1.10 WARRANTIES, GUARANTEES

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

1.11 PROGRESS PHOTOGRAPHS

A. Photographs and digital pictures shall be in color. Provide 1 copy of each digital picture on each of three (3) CDs and provide 1 print of each photograph in two (2) separate albums.

B. Photographs shall be from locations to illustrate the condition of Construction and state of progress adequately.

C. Provide up to 12 digital photographs of views randomly selected by the County, taken prior to any construction and prior to each scheduled Application for Payment.

D. Deliver electronic images, prints, and negatives to the County.

E. Each print shall be single weight paper with glossy finish and the overall dimension shall be 7-1/2-inch x 10-inches (19.05 x 25.4 cm). The print shall be clear, sharp and free of distortion after the enlargement from the negative.

F. Provide loose-leaf albums for each set of photographs to hold prints with a maximum of 50-leaves per binder.

G. Each print shall be protected by flexible, transparent acetate or plastic sheet protector leaves with metal reinforced holes. Two (2) extra leaves shall be provided in each binder.

H. Capture and provide digital, ortho-rectified, true-color, aerial photographs of the complete project site prior to start of Construction and at final completion. A final 6-inch or less ground pixel resolution is required. If using traditional photography, the photos will need to be captured at an appropriate scale and scanned at a high enough dpi to yield a final ground pixel size of 6-inches or less. If captured digitally, a final 6-inches or less ground sample distance is required. The final orthorectified photos shall use a projection

of NAD 27, State Plane West and all vertical reference shall be NAVD 88, US feet. All orthophoto mosaics shall meet a final accuracy of plus or minus 5-feet.

I. Provide a total of four (4) true-color, color balanced orthophoto mosaic prints. Three (3) prints each of the pre and post construction (final completion) orthophoto mosaics, for a total of six (6). Each orthophoto mosaic print shall be on double-weight paper with glossy finish and shall have overall dimensions of 36-inches x 58-inches. Two (2) copies of each of the digital orthophoto mosaics shall be supplied in Geotiff format on disk for each time period (pre and post construction). The final color balanced, true-color orthophoto mosaics will be projected in NAD 27, State Plane West and all vertical reference shall be NAVD 88, US feet and shall meet a final accuracy of plus or minus 5-feet.

J. The Contractor shall provide before and after photographs of each portion of the site. The below ground facilities shall include all equipment, walls, floor, piping, supports and entrance. At major locations, photographs shall include before, during, and after prints and all prints shall be placed in binders in ascending date order to show the Work as it progresses.

K. Descriptive Information:
   1. Each photograph shall have a permanent title block on the back and shall contain the typed information and arrangement as follows:
      a. ORANGE COUNTY, FLORIDA
      b. (ENTER PROJECT NAME)
      c. BID No. (Enter Bid Number)
      d. CONTRACTOR: (Name of Contractor)
      e. DATE: (When photo was taken)
      f. PHOTO NO.: (Consecutive Numbers)
      g. PHOTO BY: (Firm Name of Photographer)
      h. LOCATION: (Description of Location and View)
   2. The Contractor shall provide the Professional with a written description of each photograph. This description shall be included in the binders and a copy shall be submitted with the CDs.

1.12 PROJECT RECORD DOCUMENTS

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 SUBMITTAL PROCEDURES

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

B. Preliminary Shop Drawing Data: Within 20-days after the Award of the Contract or before the Pre-Construction Meeting, the Contractor shall submit to the County/Professional a complete listing of manufacturers for all items for which Shop Drawings are to be submitted.

C. Shop Drawing Submittal Schedule: Within 30-days after the Notice to Proceed, the Contractor shall submit to the County/Professional a complete schedule of Shop Drawings submittals with the respective dates for submission, the beginning of manufacture, testing and installation of materials, supplies and equipment, noting those submittals critical to the progress schedule.

D. Submittal Log: An accurate updated log of submittals will be maintained by the Contractor and subject to review by the County/Professional at each scheduled progress meeting.

E. If the Contractor considers any correction indicated on the Drawings to constitute a change to the Contract Drawings or specifications, the Contractor shall give written notice thereof to the County/Professional. This does not constitute a change order until accepted by the County.

F. Shop Drawing and submittal data shall be reviewed by the County/Professional for each original submittal and first resubmittal; thereafter review time for subsequent resubmittals shall be charged to the Contractor. The Contractor shall reimburse the County for services rendered by the County/Professional at the rate multiplied by the County's Professional multiplier based on the fee schedule provided to the County for this Project. If a County engineer is performing any portion of the review, this fee is based upon the hourly rate of the engineer times the County's multiplier for overhead, benefits, and expenses. The Contractor agrees that the County shall deduct such charges from the Contract Amount by a deductive Change Order.

G. Contractor Shop Drawing and Sample submittals shall include 5 copies in addition to any other copies that the Contractor wants returned. The County will retain 5 copies of approved submittals.

H. Identify Project, Project Number, date, dates of previous submittals, Contractor, Sub-Contractors, suppliers with their addresses, pertinent Drawings by sheet and detail number, and Specification Section number, as appropriate. Identify all deviations from the Contract Documents. Provide space for Contractor and Professional review stamps.

I. Contractor's delivery of Shop Drawings for review shall follow a reasonable sequence, as is necessary to support the dates on the Progress Schedule and avoid an overload of Shop Drawings awaiting review at any one time. Coordinate submittal of related items.

J. Submit Shop Drawings per the schedule of Shop Drawing submittals, inserted in 1 loose-leaf binder, with tabs and index to the County/Professional. All individual submittal sheets inserted in said binder must be clearly marked and referenced to proper paragraph and subparagraph of specifications. Cross out any items on sheets which constitute information not pertaining to equipment specified. Clearly mark all components that are provided as "optional" by manufacturer. Shop Drawings shall be approved by the Contractor prior to submittal to the County/Professional. Shop Drawings will be reviewed by the County/Professional. After County/Professional approval, reproduce and distribute in accordance with requirements herein.

K. All submissions of Shop Drawings, brochures and catalog cuts shall be accompanied by a transmittal letter listing the Drawings submitted by number and title.

L. When engineering calculations and/or professional certification of performance criteria of materials, systems, and/or equipment are required, the County is entitled to rely upon the accuracy and completeness of such calculations and certifications submitted by the Contractor. Calculations, when required, shall be submitted in a neat, clear and in an easy to follow format. Such calculations and/or certifications shall be signed and sealed by a Professional Engineer registered in the State of Florida.

M. Distribute copies of reviewed submittals to concerned parties. Instruct recipients to promptly report any inability to comply with provisions.

N. Prior to submission of Shop Drawings and samples, the Contractor shall stamp and sign the submittals. Any submission which, upon examination by the County, shows evidence of not having been thoroughly checked, or is not in compliance with the provisions of this Section will be returned to the Contractor for completion before it will be considered for review.

O. Notify the County of the need for making any changes in the arrangement of piping, connections, wiring, manner of installation, etc., which may be required by the material or equipment Contactor proposes to supply.

P. On resubmittals, direct specific attention in writing or on the revised Drawings or sample to revisions other than the corrections required by County on previous submissions.

Q. All drawings, schematics, manufacturer’s product data, certifications and other drawing submittals required for a system specification shall be submitted at one time as a package to facilitate interface checking.

R. The County will distribute Shop Drawings as follows for the indicated action taken:

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.

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

3.02 CONTRACTOR'S REVIEW

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

B. Contractor’s Checking: When checking submittals from Subcontractors and suppliers, the Contractor shall mark all sets, indicating his corrections and comments in blue or green. Copies marked in red may be returned for revision.

C. The Contractor is responsible to deliver and pick-up all submittals in a timely manner at the County/Professional's designated office. The Contractor is responsible for all related costs and expenses for the transmittal of such submittals.

3.03 COUNTY’S / PROFESSIONAL’S REVIEW

A. Corrections or comments made on Shop Drawings during review do not relieve the Contractor from compliance with the requirements of Drawings and Specifications. This check is only for review of general conformance with the design concept of this Project and general compliance with information given in Contract Documents. Any substitutions or changes shall be properly noted.

B. No action will be taken on "rough-in" Shop Drawings for plumbing and electrical connections when the items of equipment are not included in the same submittal.

C. Review Time:
   1. On a normal basis, each submittal will be returned to the Contractor within 15 working days of the date it is received. Some submittals may require additional time.
   2. If, for any reason, the above schedule cannot be met, the Contractor will be so informed within a reasonable period and the Schedule of Submittals revised. If the specific submittal affects the critical path, the Contractor shall immediately notify the County/Professional in writing. In the event of separate submittals of individual components of a system, these submittals may be held until all components of the system are submitted, and the Contractor will be so notified.

END OF SECTION

SECTION 01301

PRODUCT SUBSTITUTIONS

PART 1 - GENERAL

1.01 SUMMARY

A. General
   1. Base all bids on materials and equipment specified in the Appendix D Orange County Utilities List of Approved Products.
   2. Certain types of equipment and kinds of material are described in specifications by means of references to names of manufacturers and vendors, trade names, or catalog numbers.
      a. When this method of specifying is used, it is not intended to exclude from consideration other products bearing other manufacturer's or vendor's names, trade names, or catalog numbers, provided said products are "or-equals," as determined by County/Professional.
   3. Other types of equipment and kinds of material may be acceptable substitutions under the following conditions:
      a. Or-equals are unavailable due to strike, discontinued production of products meeting specified requirements, or other factors beyond control of Contractor; or,
      b. Contractor proposes a cost and/or time reduction incentive to the Owner.

1.02 QUALITY ASSURANCE

A. In making request for substitution or in using an approved product, Contractor:
   1. Has investigated proposed product, and has determined that it is adequate or superior in all respects to that specified, and that it will perform the function for which it is intended.
   2. Will provide same guarantee for substitute item as for product specified.
   3. Waives all claims for additional costs related to substitution which subsequently arise.

1.03 DEFINITIONS

A. Product: Manufactured material or equipment.

1.04 PROCEDURE FOR REQUESTING SUBSTITUTION

A. Substitution shall be considered only:
   1. After award of Contract
   2. Under the conditions stated herein

B. Written request through Contractor only.

C. Transmittal Mechanics
   1. Follow the transmittal mechanics prescribed for Shop Drawings in Specification Section 01300 "Submittals."
      a. Product substitution will include in the transmittal letter, either directly or as a clearly marked attachment, the items listed in Paragraph D below.

D. Transmittal Contents
   1. Product identification:
      a. Manufacturer's name
      b. Telephone number and representative contact name
      c. Specification Section or Drawing reference of originally specified product, including discrete name or tag number assigned to original product in the Contract Documents.
   2. Manufacturer's literature clearly marked to show compliance of proposed product with Contract Documents.
   3. Itemized comparison of original and proposed product addressing product characteristics including but not necessarily limited to:
      a. Size
      b. Composition or materials of construction
      c. Weight
      d. Electrical or mechanical requirements
   4. Product experience
      a. Location of past projects utilizing product.
      b. Name and telephone number of persons associated with referenced projects knowledgeable concerning proposed product.
      c. Available field data and reports associated with proposed product.
   5. Data relating to changes in construction schedule.
   6. Data relating to changes in cost.
   7. Samples
      a. At request of County/Professional.
      b. Full size if requested by County/Professional.
      c. Held until substantial completion.
      d. County/Professional is not responsible for loss or damage to samples.

1.05 APPROVAL OR REJECTION

A. Written approval or rejection of substitution to be given by the Engineer.

B. Engineer reserves the right to require proposed product to comply with color and pattern of specified product if necessary to secure design intent.

C. In the event the substitution is approved, the resulting cost and/or time reduction will be documented by Change Order in accordance with the General Conditions.

D. Substitution will be rejected if:
   1. Submittal is not through the Contractor with his stamp of approval.
   2. Request is not made in accordance with this Specification Section.

3. In the County/Professional's opinion, acceptance will require substantial revision of the original design.
4. In the County/Professional's opinion, substitution will not perform adequately the function consistent with the design intent.

E. Contractor shall reimburse the County for the cost of the evaluation whether or not substitution is approved.

PART 2 - PRODUCTS - (NOT USED)

PART 3 - EXECUTION - (NOT USED)

END OF SECTION

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SECTION 01400
QUALITY CONTROL

PART 1 - GENERAL

1.01 SITE INVESTIGATION AND CONTROL

A. Contractor shall verify all dimensions in the field and check field conditions continuously during construction. Contractor shall be solely responsible for any inaccuracies built into the Work due to Contractor's failure to comply with this requirement.

B. Contractor shall inspect related and appurtenant Work and report in writing to County any conditions which will prevent proper completion of the Work. Failure to report any such conditions shall constitute acceptance of all site conditions, and any required removal, repair, or replacement caused by unsuitable conditions shall be performed by the Contractor at Contractor's sole cost and expense.

1.02 INSPECTION OF THE WORK

A. The Work shall be conducted under the general observation of representatives of the County acting on behalf of the County to ensure strict compliance with the requirements of the Contract Documents. Such inspection may include mill, plant, shop, or field inspection, as required. The County shall be permitted access to all parts of the Work, including plants where materials or equipment are manufactured or fabricated. Inspection by the County are in addition to the inspections required of Contractor by his QC Representatives.

B. The presence of the County, however, shall not relieve the Contractor of the responsibility for the proper execution of the Work in accordance with all requirements of the Contract Documents. Compliance is a duty of the Contractor, and said duty shall not be avoided by any act or omission on the part of the County. Further, no requirement of this Contract may be waived or modified except by change order or formal (written) substitution approval.

C. All materials and articles furnished by the Contractor shall be subject to rigid inspection, and no materials or articles shall be used in the Work until they have been inspected and accepted by the County. No Work shall be backfilled, buried, cast in concrete, hidden, or otherwise covered until it has been inspected. Any Work so covered in the absence of inspection shall be subject to uncovering. Where uninspected Work cannot be uncovered, such as in concrete cast over reinforcing steel, all such Work shall be subject to demolition, removal, and reconstruction under proper inspection and no additional payment will be allowed therefore.

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

1.03 TIME OF INSPECTION AND TESTS

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

1.04 SAMPLING AND TESTING

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

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

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

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

1.05 RIGHT OF REJECTION

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

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

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

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

1.06 TESTING LABS

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

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01570

MAINTENANCE OF TRAFFIC

PART 1 - GENERAL

1.01 DESCRIPTION

This section includes identifying safety hazards and then furnishing all necessary labor, materials, tools, and equipment including, but not limited, to signs, barricades, traffic drums, cones, flashers, construction fencing, flag persons, variable message boards, uniformed police officers, warning devices, temporary pavement markings, temporary sidewalk, delineators, etc., to maintain vehicular and pedestrian traffic through and adjacent to the project area. These measures and actions shall be taken to safely maintain the accessibility of public and construction traffic by preventing potential construction hazards. All materials, work and incidental costs related to Maintenance of Traffic will be paid for at the contract lump sum price.

1.02 REQUIREMENTS

A. The Traffic Control Plan shall conform to the following standards:
   1. Standard Specifications for Road and Bridge Construction, latest edition including all subsequent supplements issued by the Florida Department of Transportation, (FDOT).
   2. Manual on Uniform Traffic Control Devices for Streets and Highways by U.S. Department of Transportation, Federal Highway Administration.
   3. Right-of-Way Utilization Regulations, Orange County, Florida, latest edition.

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

C. Sequence the Work in a manner that will minimize disruption of vehicular and pedestrian access through and around the construction area.

D. Traffic planning and control for the maintenance and protection of pedestrian and vehicular traffic affected by the Contractor's Work includes, but is not limited to:
   1. Construction and maintenance of any necessary detour equipment and facilities.
   2. Providing necessary facilities for access to residences and businesses.
   3. Furnishing, installing, and maintenance of traffic control and safety devices (e.g. signage, barricades, barriers, message boards, etc.), and flag persons as appropriate during Construction.
   4. Control of water runoff, dust and any other special requirements for safe and expeditious movement of traffic.

E. Planning, maintenance and control of traffic shall be provided at the Contractor's expense. The Contractor will bear all expense of maintaining the vehicle and pedestrian traffic throughout the work area.

F. The Contractor will ensure all personnel involved in traffic control are and capable of communicating with the public. The Contractor may be required to hire off-duty uniformed police officers, in addition to flag persons, to direct and maintain traffic. Locations and conditions requiring such uniformed police officers shall be as directed by the County. The Contractor shall be required to utilize uniformed police officers for work within FDOT maintained ROW, road closures affecting school traffic and during all night work involving a road closure or crossing on nonresidential roads.

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

1.03 SUBMITTALS

A. Submit at Contractor's own expense a Traffic Control Plan for approval by the controlling roadway agency (FDOT, Orange County Public Works or other local government) having jurisdiction over the road for approval.
   1. The Traffic Control Plan will detail procedures and protective measures proposed by the Contractor to provide for protection and control of traffic affected by the Work consistent with the following applicable standards:
      a. Standard Specifications for Road and Bridge Construction, latest edition including all subsequent supplements issued by the Florida Department of Transportation, (FDOT Spec.).
      b. Manual of Traffic Control and Safe Practices for Street and Highway Construction, Maintenance and Utility Operations, FDOT.
      c. Right-of-Way Utilization Regulations, Orange County, Florida, latest edition.

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

C. The Traffic Control Plan will be signed and sealed by a Professional Engineer registered in the state of Florida and shall include proposed locations and time durations of the following, as applicable:
   1. Pedestrian and public vehicular traffic routing.
   2. Lane and sidewalk closures, other traffic blockage and lane restrictions and reductions anticipated to be caused by construction operations. Show and describe the proposed location, dates, hours and duration of closure, vehicular and pedestrian traffic routing and management, traffic control devices for implementing pedestrian and vehicular movement around the closures, and details of barricades.
   3. Location, type and method of shoring to provide lateral support to the side of an excavation or embankment parallel to an open travel-way.
   4. Allowable on-street parking within the immediate vicinity of worksite.
   5. Access to buildings immediately adjacent to worksite.
   6. Driveways blocked by construction operations.

7. Temporary traffic control devices, temporary pavement striping and marking of streets and sidewalks affected by construction
8. Temporary commercial and industrial loading and unloading zones.
9. Construction vehicle reroutes, travel times, staging locations, and number and size of vehicles involved.

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

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT

A. The Contractor shall furnish, erect, and maintain all necessary traffic control devices, including flag person, in accordance with the Manual of Uniform Traffic Control Devices for Streets and Highways published by the U.S. Department of Transportation, Federal Highway Administration.
   1. FLAG PERSONS
      a. All flag persons used on this Project will adhere to the following requirements:
      b. Any person acting as a flag person on this Project will have attended a training session taught by a Contractor's qualified trainer before the start date of this Contract.
      c. The Contractor's qualified trainer will have completed a "Flag person Train the Trainer Session" in the 5-years previous or before the start date of this Contract and will be on file as a qualified flag person trainer.
      d. The flag person trainer's name and Qualification Number will be furnished by the Contractor at the Pre-Construction meeting. The Contractor will provide all flag persons with the Flag Person Handbook and will observe the rules and regulations contained therein. This handbook will be in the possession of all flag person while flagging on the Project.
      e. Flag persons will not be assigned other duties while working as authorized flag persons.
      f. Any person replacing flag person for break shall have the same training.

PART 3 - EXECUTION

3.01 NOTIFICATIONS

A. The Contractor will notify individual owners, owner's agents, and tenants of buildings affected by the construction, with copies to the county, 72-hours in advance of any construction activities.

B. The Contractor shall notify residents and pedestrians via variable message boards no later than 10 days prior to the closure of any road, lane or pedestrian thoroughfare.

C. The Contractor shall notify Emergency Management Services agencies, Lynx and OCPS no less than 7 days prior to such closures or whenever roads are impassable.

D. Implement closing of vehicle or pedestrian thoroughfare in accordance with the construction drawings and the approved Traffic Control Plan.

E. The Contractor will immediately notify the County of any vehicular or pedestrian safety or efficiency problems incurred as a result of the construction of the Project.

3.02 GENERAL TRAFFIC CONTROL

A. The Contractor will sequence and plan construction operations and will generally conduct Work in such a manner as not to unduly or unnecessarily restrict or impede normal traffic.

B. Unless otherwise provided, all roads within the limits of the Work will be kept open to all traffic by the Contractor. The Contractor will keep the portion of the project being used by public traffic, whether it is through or local traffic, in such condition that traffic will be adequately accommodated.

C. The Contractor will be responsible for installation and maintenance of all traffic control devices and requirements for the duration of the construction period. Necessary precautions for traffic control will include, but not be limited to, warning signs, signals, lighting devices, markings, barricades, canalizations, and hand signaling devices.

D. The Contractor will provide and maintain in a safe condition temporary approaches or crossings and intersections with trails, roads, streets, businesses, parking lots, residences, garages and farms.

E. The Contractor will provide emergency access to all residences and businesses at all times. Residential and business access will be restored and maintained at all times outside of the Contractor’s normal working hours.

F. Traffic is to be maintained on one section of existing pavement, proposed pavement, or a combination thereof. Alternating one-way traffic may be utilized and limited to a maximum length of 500-feet during construction hours. Lane width for alternating one-way traffic will be kept to a minimum width of 10-feet, or as directed by the County.

G. Travel lanes and pedestrian access will be kept reasonably smooth, dry, and in a suitable condition at all times.

H. The Contractor will make provisions at all "open cut" street crossings to allow for free passage of vehicles and pedestrians, either by bridging or other temporary crossing structures. Such structures will be of adequate strength and proper construction and will be maintained by the Contractor in such a manner as not to constitute an undue traffic hazard.

I. The Contractor will keep all signs in proper position, clean, and legible at all times. Care will be taken so that weeds, shrubbery, construction materials, equipment, and soil are not allowed to obscure any sign, light, or barricade. Signs that do not apply to construction conditions should be removed or adjusted so that the legend is not visible to approaching traffic.

J. The County may determine the need for, and extent of, additional striping removal and restriping.

K. Excavated material, spoil banks, construction materials, equipment and supplies will not be located in such a manner as to obstruct traffic, as practicable. The Contractor will immediately remove from the site all demolition material, exercising such precaution as may be directed by the County. All material excavated shall be disposed of so as to minimize traffic and pedestrian inconvenience and to prevent damage to adjacent property.

L. During any suspension, the Contractor will make passable and open to traffic such portions of the Project and/or temporally roadways as directed by the County for accommodation of traffic during the anticipated period of suspension. Passable conditions will be maintained until issuance of an order for the resumption of construction operations. When Work is resumed, the Contractor will replace or renew any Work or materials lost or damaged because of such temporary use in every respect as though its prosecution had been continuous and without interferences.

3.03 TEMPORARY SHORING

A. Use shoring to maintain traffic when it is necessary to provide lateral support to the side of an excavation or embankment parallel to an open travel-way. Provide shoring when a theoretical 2:1 or steeper slope from the bottom of the excavation or embankment intersects the existing ground line closer than 5-feet (1.5 m) from the edge of pavement of the open travel-way.

B. The Contractor will furnish, install, and remove sheeting, shoring, and bracing necessary to maintain traffic at locations shown on the Traffic Control Plan and other locations determined during construction.

END OF SECTION

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SECTION 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

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

1.02 QUALITY ASSURANCE

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

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

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

1.03 RECORD DOCUMENTS

A. Maintain and always have available for County’s the following:
   1. Required work order data per specifications
   2. Required photographs
   3. Written instructions by the County as well as correspondence related to Requests for Information (RFIs)

PART 2 - PRODUCTS

2.01 RECORD DOCUMENTS

A. Final work orders with all required data populated.

PART 3 - EXECUTION

3.01 NOT USED

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SECTION 02578

SOLID SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: Establishing a stand of grass by furnishing and placing grass sod. Included are fertilizing, watering, and maintenance as required to assure a healthy stand of grass. Solid sodding shall be placed on all slopes greater than 4:1, within 10-feet of all proposed structures, and in all areas where existing grass or sod (regardless of it's condition) is removed or disturbed by Contractor's operation unless otherwise specified or shown on the Drawings.

1.02 SHOP DRAWINGS AND SUBMITTALS

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

PART 2 - PRODUCTS

2.01 GENERAL

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

2.02 GRASS SOD

A. Grass sod for the road rights-of-way shall be of variety to match the existing adjacent area and shall be well matted with grass roots. The sod shall be taken up in rectangles, preferably 12-inch by 24-inch, shall be a minimum of 2-inches in thickness, and shall be live, fresh, and uninjured at the time of planting.

B. Grass sod for restoration of new construction sites and/or areas disturbed by construction on existing sites shall be St. Augustine well matted with grass roots. The sod shall be taken up in rectangles, preferably 12-inch by 24-inch, shall be a minimum of 2-inches in thickness, and shall be live, fresh, and uninjured at the time of planting.

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

2.03 FERTILIZER

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

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

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

2.04 WATER FOR GRASSING

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

PART 3 - EXECUTION

3.01 PREPARATION OF GROUND

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

3.02 APPLICATION OF FERTILIZER

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

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

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

3.03 PLACING SOD

A. The sod shall be placed on the prepared surface, with edges in close contact and shall be firmly and smoothly embedded by light tamping with appropriate tools.

B. Where sodding is used in drainage ditches, or on slopes of 4:1 or greater, the setting of the pieces shall be staggered to avoid a continuous seam along the line of flow. Along the edges of such staggered areas, the offsets of individual strips shall not exceed 6-inches. In order to prevent erosion caused by vertical edges at the outer limits, the outer pieces of sod shall be tamped so as to produce a featheredge effect.

C. On slopes greater than 2:1, the Contractor shall, if necessary, prevent the sod from sliding by means of wooden pegs driven through the sod blocks into firm earth at suitable intervals.

D. Sod which has been cut for more than 72-hours shall not be used unless specifically authorized by the County after the inspection thereof. Sod which is not planted within 24-hours after cutting shall be stacked in an approved manner, maintained, and properly moistened. Any pieces of sod that, after placing, show an appearance of extreme dryness shall be removed and replaced by fresh, uninjured pieces.

E. Sodding shall not be performed when weather and soil conditions are, in the County's opinion, unsuitable for proper results.

3.04 WATERING

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

3.05 MAINTENANCE

A. The Contractor shall maintain, at his expense, the sodded areas in a satisfactory condition until final acceptance of the Project. Such maintenance shall include repairing of any damaged areas and replacing areas in which the establishment of the grass stand does not appear to be developing satisfactorily.

B. Replanting or repair necessary due to the Contractor's negligence, carelessness, or failure to provide routine maintenance shall be at the Contractor's expense.

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SECTION 02660

POTABLE WATER SYSTEM

PART 1 - GENERAL

1.01 DESCRIPTION

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

1.02 QUALITY ASSURANCE

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

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

C. Prevention of electrolysis is required in accordance with AWWA C105 and when crossing, or adjacent to, a power easement, gas easements, any location where induced currents may be present, in areas where aggressive soils exist, and where shown on Drawings. Electrolytic action through the contact of dissimilar metals shall be prevented by either:
   1. The separation of one material from the other by means of an insulating or dielectric coupling (polyethylene wrap), or
   2. The use of alternative materials, as directed by the County.

1.03 SHOP DRAWINGS AND SUBMITTALS

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

1.04 JOB CONDITIONS

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

PART 2 - PRODUCTS

2.01 GENERAL

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

2.02 MATERIALS

A. Pipe, Fittings, Valves, and Ancillary Equipment shall be installed as shown on the Drawings and as specified in Division 15.

B. Additional Work: Additional items of construction, necessary for the complete installation of the systems, shall conform to specific details shown on the Drawings and shall be constructed of first-class materials conforming to the applicable portions of these specifications.

PART 3 - EXECUTION

3.01 PREPARATION

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

3.02 INSTALLATION

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

B. Pipe: The color stripe and pipe text shall be located on the top of the 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.
   1. Gradient: Pipe shall be laid straight and depth of cover shall vary to provide uniform gradient or slope to pipe, whether grading is completed or proposed at time of pipe installation. When a grade or slope is shown on the Drawings, batter boards with string line paralleling design grade, or other previously approved means, shall be used by the Contractor to assure conformance to required grade.
   2. Pipe Joint Deflection
      a. Ductile Iron Pipe: Whenever it is desirable to deflect pipe, the amount of deflection shall not exceed 75% of the maximum limits as shown in AWWA Standard C600 for ductile iron pipe.
      b. PVC Pipe: Joint deflection or pipe bending shall not be permitted. The maximum allowable tolerance in the joint due to variances in installation is 0.75° (degrees) (3-inches per joint per 20-foot stick of pipe). No bending tolerance in the pipe barrel shall be acceptable. Alignment change shall be made only with sleeves and fittings.
   3. Rejects: Any pipe found defective shall be immediately removed and replaced with sound pipe at the Contractor's expense.
   4. Joint Compounds: No sulfur base joint compound shall be used.
   5. Thrust restraints shall be accomplished by the use of mechanical restraining devices unless specifically identified otherwise on the Drawings or herein. Restraining devices shall be specified in Sections 15062 "Ductile Iron Pipe and Fittings" and 15064 "Polyvinyl Chlorine (PVC) Pipe and Fittings", respectfully.

C. Installing Valves and Boxes
   1. Valves: Valves shall be carefully inspected, fully opened, and then tightly closed and the various nuts and bolts shall be tested for tightness. Any valve that does not operate correctly shall be removed and replaced.
   2. Valve Boxes: Valve boxes shall be carefully centered over the operating nuts of the valves so as to permit a valve key to be fitted easily to the operating nut. In unpaved areas, valve boxes shall be set to conform to the level of the finished surface and held in position by a concrete collar placed under the support flange as shown on the Drawings. The letter "V" shall be etched in the curb at each valve location. The valve box shall not transmit surface loads to the pipe or valve but be supported by bedding rock as shown on the Drawings. Extensions or risers for valve boxes shall be an integral part of the box. No cut sections of D.I. or PVC pipe shall be used in extending the box to its proper height. Care shall be taken to prevent earth and other material from entering the valve box. Any valve box which is out of alignment or whose top does not conform to the finished ground surface shall be dug out and reset. Before final acceptance of the Work all valve boxes shall be adjusted to finish grade.
   3. Concrete Collar: Each valve installed in an unimproved area (outside of pavement, driveways or sidewalks) shall require a 24-inch by 24-inch by 6-inch concrete pad or collar as shown in the Drawings.

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

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

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

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

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

3.03 CLEANING

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

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

3.04 FIELD QUALITY CONTROL

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

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

d. Allowable leakage: $L = \frac{SD(P)0.5}{148{,}000}$

L = Allowable leakage (gallons per hour)
S = Length of pipe tested (feet)
D = Nominal diameter of pipe (inches)
P = Average test pressure maintained (psig)

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

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

3.05 DISINFECTING POTABLE WATER PIPELINES

A. General: Before being placed in service, all potable water pipelines shall be disinfected by chlorination. Taps for chlorination and sampling shall be uncovered and backfilled by the Contractor as required. The disinfection procedure shall be approved by the County.

B. Standard: AWWA 651, "Standard Procedures for Disinfecting Water Mains."

C. Procedure
1. Flush all dirty or discolored water from the line and introduce chlorine in approved dosages through a tap at one end while water is being withdrawn at the other end of the line.
2. The chlorine solution shall remain in the pipeline for 24-hours.
3. Following the chlorination period, all treated water shall be flushed from the line and replaced with water from the distribution system.
4. Bacteriological sampling and analysis shall be made in full accordance with AWWA Manual C651 and the appropriate FDEP permit. If necessary, the Contractor will be required to re-chlorinate.
5. Sampling and analysis shall be done by the County.

D. Approval: The line shall not be placed in service until the requirements of the State and County Public Health Department are met and the bacteriological test results are approved by the Department of Environmental Protection.

3.06 CONNECTION TO EXISTING SYSTEM

A. All connections to existing mains shall be made after complete disinfection of the proposed system and shall be made under the direction of the County. Valves separating the mains being installed from existing mains shall be operated by or under the direction of the County. The cost of the Work in making the connections shall be paid for by the Contractor.

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

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

3.07 SUPPLIER'S FIELD SERVICE:

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

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

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

END OF SECTION

SECTION 15064

POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

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

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

1.02 QUALITY ASSURANCE

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

B. Standards:
   1. AWWA C900/C905
   2. ASTM D1784 / D1785 / D2241 / D2466 / D2564 / D2729 / D2774 / D3034 / D3139 / D3212
   3. NSF 14
   4. UNI-B-1 through 5

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

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

1.03 SHOP DRAWINGS AND SUBMITTALS

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

B. Materials and Shop Drawings

C. Manufacturer's Certification
   1. Submit sworn certification of factory tests and their results.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

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

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

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

PART 2 - PRODUCTS

2.01 GENERAL

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

2.02 MATERIALS

A. Polyvinyl Chloride (PVC) Pipe
   1. Standards: AWWA C900/C905 and ASTM D1784/D3034/F679 (Gravity Sewer)
   2. Compounds: Class 12454-A or Class 12454-B
   3. PVC Gravity Pipe and Fittings: PVC gravity pipe (6-inch to 15-inch), shall conform to ASTM D3034, maximum SDR 35. PVC gravity pipe (18-inch to 36-inch), shall conform to ASTM F679 and uniform minimum "pipe stiffness" at 5% (percent) deflection shall be 46-psi. The joints shall be integral bell elastomeric gasket joints manufactured in accordance with ASTM D3212 and ASTM F477. Applicable UNI Bell Plastic Pipe Association standard is UNI B.
   4. PVC Pressure Pipe and Fittings: All PVC pipe of nominal diameter 4 to 12-inches shall be manufactured in accordance with AWWA Standard C900 and greater than 12-inches shall be manufactured in accordance with AWWA Standard C905. The PVC pipe shall have a minimum working pressure rating of 100-psi and shall have a maximum dimension ratio of 18. Pipe shall be the same outside diameter as ductile iron pipe.
   5. Dimension Ratio/Thickness: (unless otherwise shown on the Drawings)
      a. Raw Wastewater:
         (1) Pressure Systems: DR 18
         (2) Gravity Systems: DR 35 (ASTM D3034) or PS 46 (ASTM F679)
      b. Treated Wastewater: DR 18
      c. Reclaimed Water: DR 18
      d. Raw Water: DR 18
      e. Potable Water: DR 18
      f. Irrigation Piping: Schedule 40 or SDR 21
   6. Joints:
      a. Push-on integral bell elastomeric gasket joints:
         (1) Standards: ASTM D3212/D3139/F477 and UNI-B-1
         (2) Gaskets:
            (a) Potable and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) rieber type.

      Wastewater Service: Styrene Butadiene Rubber (SBR) rieber type for C900 / C905 pipe. Styrene Butadiene Rubber (SBR) ring type for gravity systems.

            (b)

         (3) Pipe Markings: Pipes shall have a manufacturer's home-mark on the spigot. On field cut pipe, the Contractor shall provide home-mark on the spigot in accordance with manufacturer's recommendations.
      b. Solvent weld (nominal diameter less than 4-inches):
         (1) Standards: ASTM D2466/D2564
         (2) Type: Slip Fitting Socket (tapered)
         (3) Exclusions: Plastic saddle and flange joints will not be used.

c. Restrained Joints:
   (1) Restrained joint devices shall be made specifically for PVC pipe and meet or exceed the requirements in ASTM F-1674.
   (2) Manufacturers: Uni-flange mechanical joint restraints and bell restraints (for all sizes); Meg-a-lug system as manufactured by EBBA Iron (sizes 12-inches or less), or acceptable equal.
   (3) Design pressure rating equal to or above test pressure as specified herein.
d. Pipe Length:
   (1) Pressure systems: 20-feet maximum nominal length
   (2) Gravity systems: 13-feet minimum nominal length

B. Fittings - Pressure Systems (nominal diameter 4-inches and greater):
   1. Materials: Ductile iron
   2. Joints: Mechanical Joint, Minimum 350-psi pressure rating
   3. Gaskets:
      a. Water and Reclaimed Water Service: Styrene Butadiene Rubber (SBR) ring type
      b. Wastewater Service: Neoprene rubber ring type
   4. Exclusions: Standard double bell couplings will not be acceptable where the pipe will slip completely through the coupling.
   5. All fittings shall conform to either ANSI/AWWA C110/A21.10 and/or C153/A21.53, latest revision, and shall be ductile iron.
   6. All fittings shall have a date code cast (not printed or labeled), with identification of the date, factory and unit at which it was cast and machined. Fittings shall have distinctly cast on them the pressure rating, nominal diameter of openings, manufacturer's name, the country where cast, and deflection angle. Ductile iron fittings shall have the letters "DI" or "Ductile" cast on them.
   7. All potable water main fittings shall have NSF certification and ISO 9001 certification for both the foundry and manufacturer. The NSF 61 certification shall be issued on all coatings and linings, from the said manufacturers that are used for potable water applications.
   8. All ductile iron fittings shall have exterior coatings, including markings and colors, and interior linings in conformance with Section 15062 "Ductile Iron Pipe and Fittings."

C. Fittings - Pressure Systems (nominal diameter less than 4-inches)
   1. Material: Polyvinyl Chloride (PVC)
   2. Joints: Slip fitting tapered socket with solvent weld
   3. Solvent: Sure Guard 12 or acceptable equal
   4. Exclusions: Plastic saddle and flange joint fittings shall not be used

2.03 LOCATION MARKERS, LOCATION WIRE AND IDENTIFICATION MARKINGS

A. Electronic Markers and Locator System (for reclaimed water and wastewater ONLY)
   1. Markers: Markers shall consist of a passive device capable of reflecting a specifically designated repulse frequency tuned to the utility (service) being installed. Markers shall be color coded in accordance with the American Public Works Association's "Utility Locating and Coordinating Council Standards." Colors shall be: Wastewater and Reclaimed Water - #1404 Green. Markers shall be full range. Markers shall be installed directly above the centerline of the respective pipeline at intervals not to exceed 100-feet, at each fitting (tees, wyes, crosses, reducers, plugs, caps and bends) or change in horizontal direction and at each valve along the pipeline. Markers shall be hand backfilled to 1-foot above the pad and have a finished depth of burial of not less than 2-feet or more than 6-feet. No separate payment shall be made for furnishing and installing the respective frequency and color-coded electronic pad type marker.
   2. Locator System: Marker locator set shall be the 3M Dynatel 1420 or 3M Dynatel 1420E Electronic Marker System Marker Locator, or acceptable equal. The Contractor shall furnish 1 locator set for each type of service piping installed on the Project (i.e.: reclaimed water, wastewater.) to the County. Each unit shall incorporate the following features and accessories:
      a. Unit(s) shall be tuned to the proper frequency for each type (service) of piping.
      b. Field strength meter that provides visual indication of the return signal
      c. Function switch for selection of operation mode
      d. Sensitivity control to adjust the receiver gain
      e. Audio speaker for signal response
      f. Battery access panel containing condensed operating instructions
      g. Auxiliary headset and heads set jack
      h. Permanently attached shoulder straps
      i. Rugged shockproof and weatherproof storage/carrying case
   3. Manufacturer: System shall be Scotch Mark Locator System, or acceptable equal.

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

C. Identification Markings:
   1. Pipe furnished in solid color or white with color lettering as indicated below.
      a. Lettering along top 90° (degrees) of pipe, minimum 3/4-inch in height with appropriate wording appearing 1 or more times every 21-inches along the entire length of the pipeline.

(1) Raw Wastewater: Safety Green
(2) Reclaimed Water: Purple (Pantone 522C)
(3) Potable Water: Safety Blue

PART 3 - EXECUTION

3.01 INSTALLATION

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

B. Underground Polyvinyl Chloride (PVC) Pipe and Fittings
   1. Bedding: Firm, dry and even bearing of suitable material. Blocking under the pipe will not be permitted.
   2. Placement/Alignment:
      a. Installation shall be in accordance with lines and grades shown on the Drawings. For pressure systems, deflection of joints shall not exceed 75% of that recommended by the manufacturer.
      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.

h. Field Cutting: PVC pipe can be cut with a handsaw or power driven abrasive disc making a square cut. The end shall be beveled with a beveling tool, wood rasp or power sander to the same angle as provided on the factory-finished pipe. The insertion line on the spigot shall be remarked to the same dimensions as the factory-marked spigot.

i. All Contractor pipe crews utilizing PVC pressure pipe shall be trained on an annual basis by Uni-Bell in coordination with the County and attended by the manufacturer's representative of the respective approved Manufacturers in Appendix D "List of Approved Products." The Uni-Bell PVC training session will consist of proper handling, storage, installation, and compaction as well as County requirements regarding PVC pipe and deflection. Every person handling, installing or backfilling PVC pipe shall not be permitted to install County owned and / or maintained pipe without training.

j. Approved manufacturers representatives (Appendix D "List of Approved Products"), not present at the hosted Uni-Bell training session or individuals of pipe crews not in attendance shall be trained on every project site. On-site project training shall be for each manufacturer of pipe utilized on-site, per crew and per project. Specifically each crewmember shall be trained on every project by every pipe manufactures representative regardless of previous on-site training. Every person handling, installing or backfilling PVC pipe shall not be permitted to install County owned and / or maintained pipe without training.

k. PVC Gravity Pipe Installation: Gravity sewer pipe shall be installed to the homing mark, no tolerance. Any noticeable separation shall be removed and reinstalled. The homing mark may be disregarded to meet the maximum of 1-inch separation between bell and spigot requirement. Joints:

l. Joint Placement:
   (1) Push on joints: Pipe shall be laid with the bell ends facing upstream. The gasket shall be inserted and the joint surfaces cleaned and lubricated prior to placement of the pipe. After joining the pipe, a metal feeler shall be used to verify that the gasket is correctly located.
   (2) Mechanical Joints: Pipe and fittings shall be installed in accordance with the "Notes on Method of Installation" under ANSI A21.11/AWWA C111. The gasket shall be inserted and the joint surfaces cleaned and lubricated with soapy water before tightening the bolts to the specified torque.

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

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

3.02 CLEANING AND FIELD TESTING

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

END OF SECTION

SECTION 15066

HIGH-DENSITY POLYETHYLENE (HDPE) PIPE AND FITTINGS

PART 1 - GENERAL

1.01 DESCRIPTION

Scope of Work: Provide and install high-density polyethylene (HDPE) pipe and fittings of the sizes and in the locations shown on the Drawings and as specified for use in directional drilling.

1.02 STANDARDS

A. Pipe 1/2-inches (13-mm) through 3-inches (76-mm) shall conform to AWWA C901 and the Specifications.

B. Pipe and fittings 4-inches (102-mm) through 60-inches (1,524-mm) shall conform to AWWA C906 and the Specifications.

1.03 SHOP DRAWINGS AND SUBMITTALS

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

B. Submit manufacturers recommended method for butt-fusing joints.

C. The polyethylene pipe manufacturer shall provide certification that stress regression testing has been performed on the specific product. Certification shall include a stress life curve per ASTM D2837.

D. Provide certification that the material is listed by the Plastic Pipe Institute in PPI TR-3 with a hydrostatic design basis of 1,600-psi (11 MPa) at 73°F. The PPI listing shall be in the name of the pipe manufacturer and shall be based on ASTM D2837 and PPI TR-3 testing and validation of samples of the pipe manufacturer's production pipe.

E. The manufacturer's certification shall state that the pipe was manufactured from 1 specific resin in compliance with these Specifications. The certificate shall state the specific resin used, its source, and list its compliance to these specifications.

F. Submit certified lab data to verify specified physical properties. Certify that tests are representative of pipe supplied for this project.

G. Submit affidavit of compliance with referenced standards (e.g., AWWA C901, C906, etc.).

H. Submit qualification certificates for operators of heat fusion equipment.

I. Submit schedule for placement of and removal of test bulkheads.

J. Submit certification that materials intended to contact potable water are listed under NSF 61.

1.04 INSPECTION

All materials and installation furnished under this specification are subject to inspection by the County.

1.05 QUALITY AND WORKMANSHIP

A. The pipe and fitting manufacturer's production facilities shall be open for inspection by the County or his designated agents. During inspection, the manufacturer shall demonstrate that the facilities are capable of manufacturing the pipe and fittings required by this specification, that a quality control program meeting the minimum requirements of ASTM D3035 and ASTM F714 is in use, and that facilities for performing the tests required by this specification are in use.

1.06 QUALIFICATION OF FUSION OPERATORS

A. Each operator performing fusion joining shall be qualified in the use of the manufacturer's recommended fusion procedure(s) by the following:

Appropriate training or experience in the use of the fusion procedure.

1. Making a sample joint according to the procedure that passes the following inspections and tests:
   a. The joint shall be visually examined during and after joining and found to have the same appearance as a photograph or sample of an acceptable joint that was joined in accordance with the procedure; and
   b. The joint shall be tested or examined by 1 of the following methods:
      (1) Pressure and tensile test as described in 49 CFR 192.283
      (2) Ultrasonic inspection and found to be free of flaws that would cause failure
      (3) Cut into at least 3 longitudinal straps, each of which is:
         (a) Visually examined and found to be free of voids or unbonded areas on the cut surface of the joint, and
         (b) Deformed bending, torque, or impact and if failure occurs, it must not initiate in the joint area.
2. Each operator shall be re-qualified under the procedure if during any 12-month period:
   a. Operator has not made any joints under the procedure; or
   b. Operator has 3 joints or 3% of the joints made, whichever is greater, that are found unacceptable by testing according to 49 CFR 192.513.

1.07 DELIVERY, STORAGE, AND HANDLING

A. On site pipe storage shall meet all manufacturers' requirements.

B. Transport individual pipe lengths to the job site on padded bunks with nylon tie-down straps or padded bonding to protect the pipe. Coiled HDPE pipe shall be stored in a manner to ensure safety. Protect the pipe from sharp objects. Anchor pipe securely to prevent slippage.

C. Store individual pipe lengths on earth berms or timber cradles in the numerical order of installation. Stack the heaviest series of pipe at the bottom. Do not stack pipe in excess of 20-rows high.

D. Protect the pipe from stones and sharp objects.

E. Store fittings in their original cartons.

F. Lift pipes with handling beams or wide belt slings near the middle of joints as recommended by the pipe manufacturer. Do not use cable slings, chains, or hooks.

G. Before installation, check pipe and fittings for cuts, scratches, gouges, buckling, kinking, or splitting. Remove any pipe section containing defects by cutting out the damaged section in a complete cylinder.

PART 2 - PRODUCTS

2.01 GENERAL

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

2.02 PIPE

A. Pipe shall have a nominal IPS (iron pipe size) or ductile iron pipe size OD. The dimension ratio shall be verified by the Contractor based on the pipe pull strength and the pressure rating of the pipe supplied shall be (DR 9) pressure class 160 for water main and reclaimed water main, and (DR 11) 100 for wastewater force main, in accordance with Table 5 of AWWA C906. The pipe shall be homogenous throughout and free of visible cracks, holes, voids, foreign inclusions, or other deleterious defects and shall be identical in color, density, melt index, and other physical properties throughout.

B. Pipe shall have a minimum hydrostatic design basis (HDB) of 1,600-psi (11 MPa), as determined in accordance with ASTM D2837.

C. Pipe Material
   1. Pipes shall be marked in accordance with AWWA requirements (C901 Section 2.4 or C906 Section 3.1, as appropriate).
   2. AWWA C901 pipe (1/2-inch (13-mm) through 3-inches (76-mm)) shall be PE 3408 DR 9, colored blue for water, purple (Pantone 522C lavender) for reclaimed water, and green for wastewater. AWWA C901 pipe shall be as manufactured by Endot Endopure or equal.

3. AWWA C906 pipe [(4-inches (102-mm) through 60-inches (1,524-mm)] shall be color coded as above with 4 co-extruded equally spaced stripes of the same material as the pipe. Stripes printed on the pipe outside surface shall not be acceptable.
4. Materials used for the manufacture of polyethylene pipe and fittings shall be very high molecular weight, high-density ethylene/hexene copolymer PE 3408 polyethylene resin meeting the requirements of Table 15066-1.

Table 15066-1
Physical Property and Pipe Performance Requirements

Property	Specification	Units	Minimum Values
Material Designation	PPI/ASTM	---	PE3408
Material Classification	ASTM D1248	---	III C 5 P34
Cell Classification	ASTM D3350	---	345434C
Hardness	ASTM D2240	Shore D	64
Compressive Strength (Yield)	ASTM D695	psi	1,600
Tensile Strength @ Yield (Type IV Spec.)	ASTM D638 (2%/min)	psi	3,200
Elongation @ Yield	ASTM D638	%, min	8
Tensile Strength @ Break (Type IV Spec.)	ASTM D638	psi	3,500
Elongation @ Break	ASTM D638	%, min.	600
Modulus of Elasticity	ASTM D638	psi	110,000
ESCR:			
(Cond A, B, C: Mold. Slab)	ASTM D1693	Fo, Hrs	Fo>5,000
(Compressed Ring)	ASTM F1248	F50, Hrs	F50>1,000
Slow Crack Growth	Battelle		Fo>32
	Method	Days to Failure	Minimum Values
Impact Strength			
(IZOD) (0.125-inch thick)	ASTM D256	in-lb/in	
	(Method A)	Notch	42
Linear Thermal			
Expansion Coef	ASTM D696	in/in/°F	1.2 x 10-4
Thermal Conductivity	ASTM C177	BTU, in/	2.7
		Ft2/hrs/°F	
Brittleness Temp	ASTM D746	°F	<-180
Vicat Soft. Temp	ASTM D1525	°F	+257
NSF Listing	Standard 61	---	Listed

Note: * Standard deviation 0.01.

5. The pipe shall be extruded from pre-compounded resin. In-plant blending of resin is unacceptable.

2.03 NIPPLES AND FLANGED STUB ENDS

Short nipples and stub ends shall be of the same material as the HDPE pipe.

2.04 FITTINGS

A. Fittings shall be made from material meeting the same requirements as the pipe. Fittings shall be fabricated by the manufacturer of the pipe.

B. Fittings shall meet the appropriate AWWA standard for the size involved (C901 or C906) and shall be Pressure Class 160 for water main and reclaimed water main and Pressure Class 100 for wastewater force main.

C. Molded fittings shall be manufactured in accordance with ASTM D3261 and shall be so marked.

D. Mechanical fittings, when used, shall be specifically designed for, or tested and found to be acceptable for use with HDPE pipe.

E. Fittings used to connect with dissimilar pipe materials shall be provided as per Section 15062 "Ductile Iron Pipe and Fittings."

2.05 JOINTS

A. Sections of polyethylene pipe shall be joined into continuous lengths on the job site above ground. The joining method shall be the butt fusion method and shall be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures shall be capable of meeting all conditions recommended by the pipe manufacturer.

B. Butt fusion joining shall result in joint weld strength equal to or greater than the tensile strength of the pipe. Socket fusion shall not be used. Extrusion welding or hot gas welding of HDPE shall not be used. Flanges, unions, grooved-couplers, transition fittings, and some mechanical couplers may be used to connect HDPE pipe mechanically without butt-fusion only where shown in the Drawings.

C. Ductile Iron to HDPE Connections
   1. Flanged connections between ductile iron pipe or fittings and HDPE pipe or fittings shall meet all requirements of Section 15062 "Ductile Iron Pipe and Fittings."
   2. Mechanical joint connections between ductile iron pipe or fittings and HDPE pipe or fittings shall use ductile iron mechanical joint glands conforming to AWWA C111 and AWWA C153. Mechanical joints shall be fully thrust restrained. Gaskets, bolts, and hexagonal nuts shall be standard rubber gaskets conforming to AWWA C111. Follower gland shall match class 350 compact fittings.
   3. HDPE pipe stiffeners shall be constructed of stainless steel and shall be flanged on one end to prevent over-insertion into the receiving pipe.

2.06 LOCATION DETECTION WIRES

A. Materials: Two continuous, insulated 10-gauge copper wires.

B. Installation: Wires shall be attached to the centerline of the HDPE pipe every 5-feet. Wires shall terminate at top of each valve box and be capable of extending 12-inches (305-mm) above the top of the box in a manner so as not to interfere with valve operation.

PART 3 - EXECUTION

3.01 HEAT FUSION

A. Use fusion equipment specially designed for heat fusion of HDPE. The equipment utilized shall be regulated for the different melt strength materials. Compatibility fusion techniques shall be used when polyethylene of different melt indexes are fused together.

B. Use the following procedure to butt fused HDPE pipe. If a procedure noted below contradicts manufacturer's recommendations, follow the manufacturer's recommendation.
   1. Maintain the proper temperature of the heater plate as recommended by the pipe manufacturer. Check it with a tempilstik or pyrometer for correct surface temperature.
   2. Clean pipe ends inside and outside with a clean cotton cloth to remove dirt, water, grease, and other foreign materials.
   3. Square (face) the pipe ends using the facing tools on the fusion machine. Remove all burrs, chips, and fillings before joining pipe or fittings.
   4. Check the line-up of pipe ends in the fusion machine to see that pipe ends meet squarely and completely over the entire surface to be fused. The clamps shall be tight so that the pipe does not slip during the fusion process.
   5. Insert the clean heater plate between the aligned ends and bring the ends firmly in contact with the plate but do not apply pressure while achieving the melt pattern. Allow the pipe ends to heat and soften. Softening depths shall be per the manufacturer's recommendation.
   6. Carefully move the pipe ends away from the heater plate and remove the plate (if the softened material sticks to the heater plate, discontinue the joint, clean heater plate, square pipe ends, and start over).
   7. The melted ends shall be connected rapidly but not slammed together. Apply enough pressure to form a double rollback bead to the body of the pipe around the entire circumference of the pipe about 1/8-inch (3.175-mm) to 3/16-inch (4.763-mm) wide. Pressure is necessary to cause the heated material to flow together.
   8. Allow the joint to cool and solidify properly. Remove the pipe from the clamps and inspect the joint appearance.

3.02 OPERATIONS INCIDENTAL TO JOINT COMPLETION

A. Plan joint completion to accommodate temporary test bulkheads for hydrostatic testing on the day of installation.

3.03 ASSEMBLING JOINTS

A. Flanged Joints
   1. Flange adapters shall be pressure rated the same as the pipe. Flange adapters shall be heat fused to the pipe as outlined in the heat fusion section.
   2. Gaskets shall be used between the polyethylene flange adapters when recommended by the HDPE pipe manufacturer. Sufficient torque shall be applied evenly to the bolts to prevent leaks. After initial installation and tightening of flanged connections, allow the connections to set for a few hours then conduct a final tightening of the bolts.
   3. Lubricate nuts and bolts with oil or graphite prior to installation.
   4. Check operation of valves connected to molded stub end flange adapters. Insert polyethylene spacer if recommended by pipe manufacturer for clearance.

B. Mechanical Joints
   1. Wipe the socket and the plain end clean. Lubrication and additional cleaning should be provided by brushing both the gasket and plain end with an approved pipe lubricant just prior to slipping the gasket onto the plain end for joint assembly. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket with the narrow edge of the gasket toward the plain end.
   2. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.
   3. Push the gland toward the socket and center it around the pipe with the gland lip against the gasket. Insert bolts and hand tighten nuts. Make deflection after assembly but before tightening bolts.
   4. Tighten the bolts to the normal range of bolt torque as indicated in AWWA C-600 while maintaining approximately the same distance between the gland and the face of the flange at all points around the socket.
   5. When connection is being made to HDPE pipe or fittings use a welded flange to connect to fittings.

3.04 INSTALLATION

A. Installation of High-Density Polyethylene Pipe
   1. All high-density polyethylene (HDPE) pipe shall be handled, stored, assembled, and installed in accordance with AWWA C906, manufacturer's recommendations, and these Specifications.
   2. HDPE pipe shall be installed using directional drilling method of construction in accordance with Section 02665 "Horizontal Directional Drilling of Pressure Mains."

B. Installation of HDPE Service Connections
   1. HDPE AWWA C901 (1/2-inch through 3-inch) water and reclaimed water service connections crossing roads shall be installed in a PVC casing pipe. PVC casing pipe may be installed by push/pull (reaming) methods as approved by the County. PVC casing pipe shall be Schedule 40 and meet the requirements of ASTM D1785. PVC fittings shall be Schedule 40 and shall meet the requirements of ASTM D2466. Casing pipe/carrier pipe size shall be as follows:

Carrier Pipe (Nominal Dia.)	Casing Pipe (Nominal Dia.)			
	Size	O.D	Wall	I.D
1-inch	2-1/2-inches	2.875	0.203	2.469
1-1/4-inch	3-inches	3.50	0.216	3.068
1-1/2-inch	3-1/2-inches	4.00	0.226	3.548
2-inch	4-inches	4.5	0.237	4.026

2. Casing pipe shall be air pressure tested for leaks immediately upon completion of each crossing at a minimum test pressure of 20-psi (.138 MPa).
3. Following installation of carrier pipe within casing, install a plug in each open end of casing. Plugs shall be suitable for restraining against external earth load.

3.05 DISINFECTION OF PIPE

A. Flush and disinfect potable water pipe in accordance with Section 02660 "Potable Water System."

3.06 HYDROSTATIC TESTING

A. Perform hydrostatic testing for leakage prior to installation and following installation in accordance with manufacturer's written recommendations.

B. All pressure piping shall be hydrostatically tested at a pressure equivalent to 1-1/2 times the working pressure, but not less than 150-psi (1.034 MPa), unless otherwise noted. No high-density polyethylene pipe section under test will be accepted if the make-up water amount is greater than that specified in applicable specification Section 02660 "Potable Water System", Section 02661 "Wastewater Force Mains", and Section 02662 "Reclaimed Water System."

3.07 MANDREL TESTING

A. Perform mandrel testing through the entire length of the installed HDPE pipe. The mandrel size shall be 90% of the inside diameter of the pipe.

END OF SECTION

APPENDIX A

STANDARD OPERATING PROCEDURES

MS-05 Meter Replacement (5/8 to 1 inch)

D-MS-06 Piped Meter Box Installation (5/8 to 1 inch) with Existing Service

D-MS-07 Piped Meter Box Installation (5/8 to 1 inch) with New Service

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ORANGE COUNTY UTILITIES FIELD SERVICES DIVISION Standard Operating Procedure	
Procedure: **Meter Replacement (5/8" to 1")**	**Number:** **D-MS-05**
Effective Date: **20 March 2014**	**Revision Date:** **9 July 2019**

A. PURPOSE:

The primary function of a meter is to measure and display the amount of water passing through a service point. A metered water system is one in which meters are used at all strategic points of a distribution system, from the time water leaves the plant until it reaches all service points. Metering provides many benefits. Meters are used to quantify water produced, the water used by the customers, and water losses. Furthermore, meters assist in water consumption control because customer usage charges are billed by the volume of water measured by the meter, which deters excessive use of water.

Orange County Utilities replaces its customer's 5/8" meter to 1" meters when the meter reaches the end of its useful life. Typical useful life of a 5/8" meter is up to 1.5 million gallons or ten years of service. The 1" meter's useful life is two million gallons or ten years. These numbers vary by manufacturer and purchase contracts negotiated. Removed meters are taken to the Meter Shop where they are tested for accuracy, to monitor and record the results for performance history and determining useful life of that specific type of meter in Orange County Utilities water and setting conditions.

Some customers will challenge their water bills and request their meters be tested for accuracy. These meters are also taken to the Meter Shop and tested. Meters may also be replaced due to stoppage resulting from debris in water, fogged, scratched or broken registers, or for leaks that develop at the bottom plate.

This procedure is designed to provide a method with specific guidelines and steps in properly replacing a 5/8" to 1" water meter.

B. REFERENCES:

1. M6 Water Meters – Selection, Installation, Testing, and Maintenance. 5th Edition. Denver: American Water Works Association, 2012.
2. Orange County Utilities Safety and Health Manual
3. Orange County Utilities, Field Services Division Standard Operating Procedures (SOPs):
   a. D-MS-02 Curb Stop Replacement
   b. FS-CT-01GIS – Locating Addresses and Assets
   c. D-MS-04 Meter Leaks
   d. FS-CT-05Syclo Data Entry
4. Neptune Water Meters < http://www.neptunetg.com/water.cfm?id=432>
5. Sensus Water Meters < http://www.sensus.com/>

6. Water Distribution Systems Operation and Maintenance. 7th edition. Sacramento: CSU, 2018.

C. SKILL AREA:

This section refers to the skills required for the Orange County Utilities (OCU) Skills Testing. The objective during the training of a specialist is to use the SOP's specific to a skill area in preparation for learning of a skill and the test.

1. Meters and Services
2. Operation and Maintenance of Piping Systems

D. PERSONNEL:

Trained Field Specialist or above

E. EQUIPMENT:

1. Equipment
   a. Personal Protective Equipment (PPE)
      i. Protective eyewear
      ii. Reflective vests
      iii. Safety Shoes
      iv. Safety gloves
   b. Line plug
   c. Water on road sign
2. Materials
   a. Joint compound/Teflon tape
   b. Meters 5/8" to 1"
   c. Meter couplings
   d. Rubber washers
3. Tools
   a. Curb stop key
   b. Hand shovel
   c. Hand pump
   d. Meter box lid lifter
   e. Meter jumper cables
   f. Standpipe
   g. Meter wrenches
   h. Nut driver
   i. Pliers
   j. Screw driver
   k. Shovels

F. FORMS:

1. Field Services Division Service Information Door Hanger
2. SOP Checklist/Job Plan (See Attachment 1)

G. SAFETY:

1. General Safety:
    a. All employees must be familiar with the Orange County Utilities safety policies as outlined in the Orange County Utilities Health and Safety Plan.
    b. Water Distribution Systems contains numerous potential hazards. Improper operation of equipment can result in damage to equipment and/or serious injury to personnel.
    c. Employees are required to perform assigned tasks in a safe and responsible manner and wear appropriate personal protective equipment (PPE) at all times.
2. Operational Safety:
    a. All field personnel should be careful and aware of the following potential hazards:
        i. Animals (i.e. snakes, insects, mammals)
        ii. Poisonous plants
        iii. Traffic
        iv. Other utility lines (gas, electrical, etc.)
    b. To some degree, all field personnel are involved in the manual handling and lifting of materials. The types of injuries that can potentially result from these activities vary, and include back injuries, hernias and sprains. These injuries can be minimized by practicing proper handling, digging, and lifting techniques as well as by using equipment properly. (i.e. shovels, pry bars, and tools)
    c. Vehicle parking while performing assigned task needs to address your own personal safety and the safety of the public. Your vehicle needs to be parked with the flow of traffic; safety flashers need to be on; safety cones need to be placed at front and rear of vehicle as a minimum (see figure A).

Figure A. Vehicle parking

d. Meter jumper cables will be required if both the house line and service line are electrically conductive, such as galvanized or copper. Some house lines have electrical wiring grounded to the water lines and may cause a shock to field personnel who are performing this procedure. If the house and service lines are both electrically conductive, utilize meter jumper cables as a precautionary measure. Clamp end of the meter jumper cable to the service line, and the other end to the house line. This precaution will prevent potentially harmful electric shock to the field specialist. (See Figures B through D below for meter jumper cable configuration)

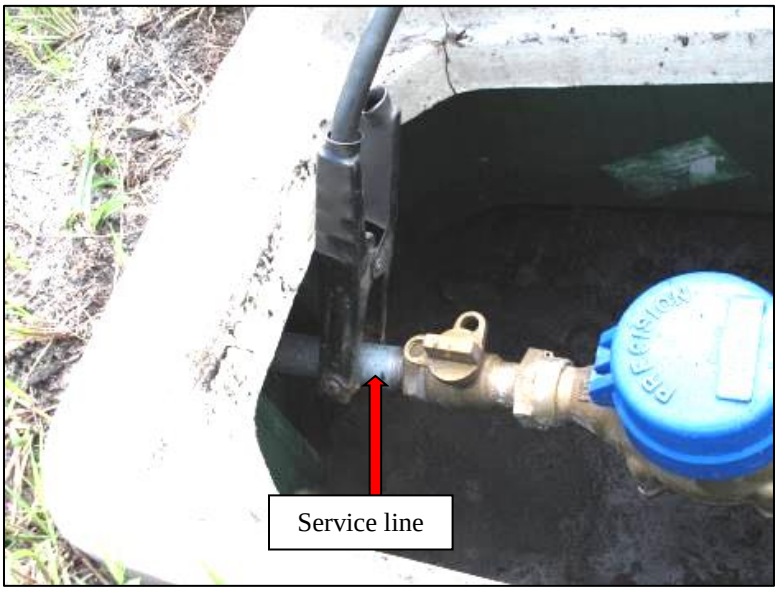


Figure B. One end of jumper cable clamped on service line

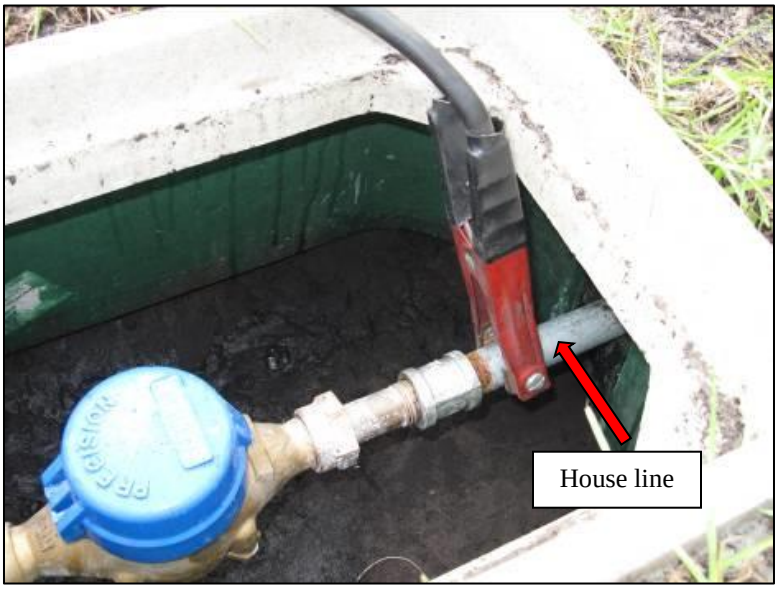


Figure C. The other end of jumper cable clamped on house line

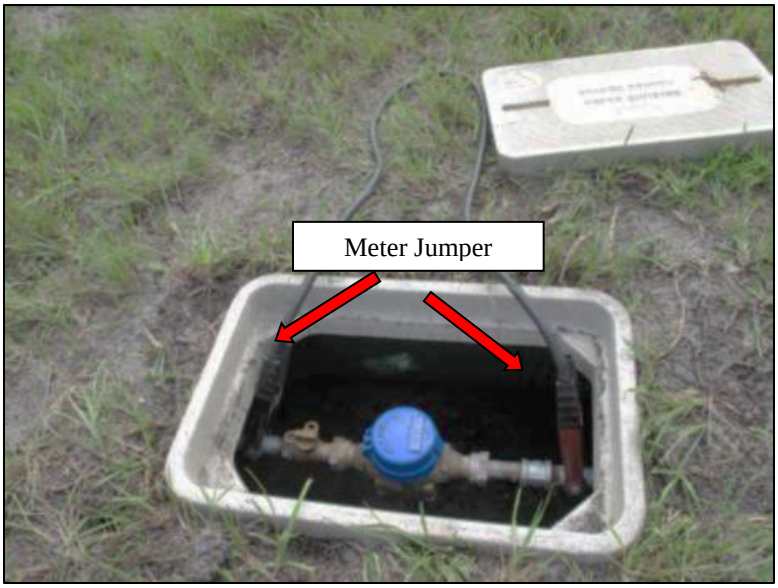


Figure D. Full meter jumper cable configuration

H. PROCEDURE:

1. Review Maximo work order.
2. Use the Geographic Information System (GIS) software on your laptop to obtain the address and location of the meter and curb stop of the property or house. (see figure 1) (Refer to SOP # FS-CT-01, "GIS – Locating Addresses and Assets.")

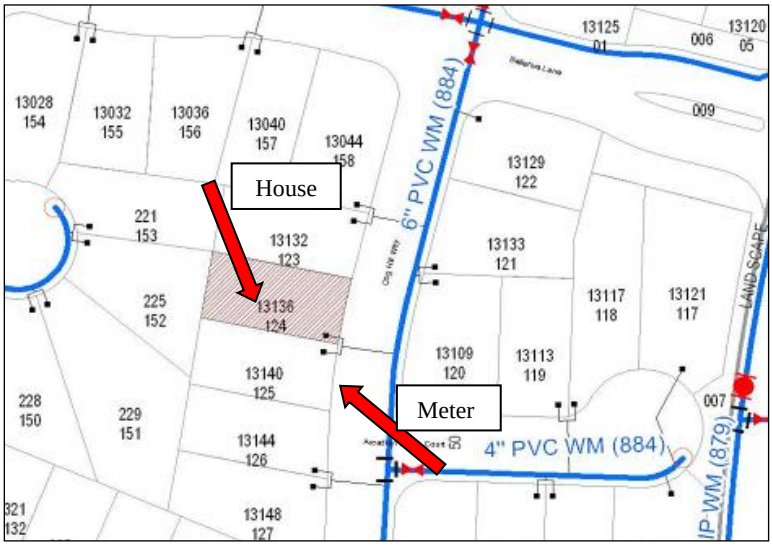


Figure 1. GIS

3. Locate and remove the meter lid using the meter box lid lifter, pliers or wrench (see figure 2).

Figure 2. Meter box lid removal

4. Excavate and clean out meter box and leave enough clearance around meter and curb stop to work with. Verify the material of house and service lines in order to see if jumper cables are required. Refer to section G.2.d. for meter jumper cable configuration. (see figure 3)

Figure 3. Cleaning out meter box

5. Using information from the Maximo work order, identify which meter is the one being replaced.
   a. Read the meter serial number from the meter register lid (see figure 4).

Figure 4. Meter serial number

6. Locate Backflow Device
   a. Record make/model, serial number, size and location. Enter information you recorded in its specific location.

NOTE: This information will be needed to cross reference the information in Syclo.

7. Notify customer that the water service will be interrupted for a meter replacement.
   a. If customer agrees, go to step H.9.
   b. If customer requests a delay of about 15 minutes or so because someone is taking a shower or a clothes/dishwasher is in operation, tell the customer you will return in approximately 15 minutes. Use that time to set up and prepare for the job. When the agreed upon time has passed, inform the customer that water service will be interrupted, and go to step H.9.
   c. If the customer requires more than 15 minutes before the water can be shut off, inform the customer that you will reschedule the job. Change Maximo work order status to "On Hold".
   d. If the customer is not at home, look at the water meter.
      i. If the water meter is not running, i.e., no water is being consumed, go to step H.9.
      ii. If the meter's low flow indicator is moving very slowly, this indicates a leak in the customer's house line or in the house itself. Try to determine where the leak is, then proceed with the meter replacement by going to step H.9.
      iii. If you determine that there is a leak in the customer's house line or in the house itself, leave a note to the customer to that effect on a door hanger before leaving the job site.

NOTE: If any additional work needs to be done other than a meter replacement, a work order must be created.

8. Record the existing meter reading (see figure 5).

NOTE: If the meter glass is fogged, break and remove the glass with the appropriate tools and PPE.

Figure 5. Meter Reading

9. Turn off the water service by closing the curb stop using the curb stop key. Turn clockwise 1/4 to close (Refer to figures 6 through 8).

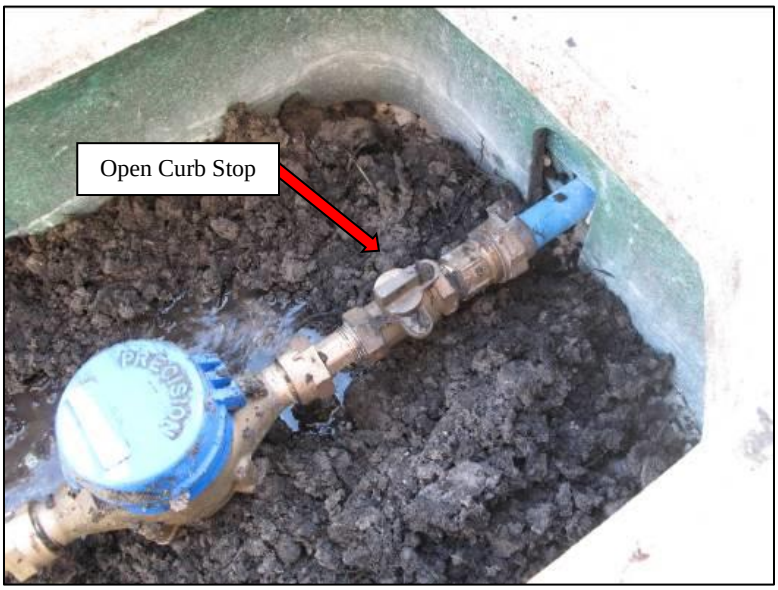


Figure 6. Curb stop in the open position

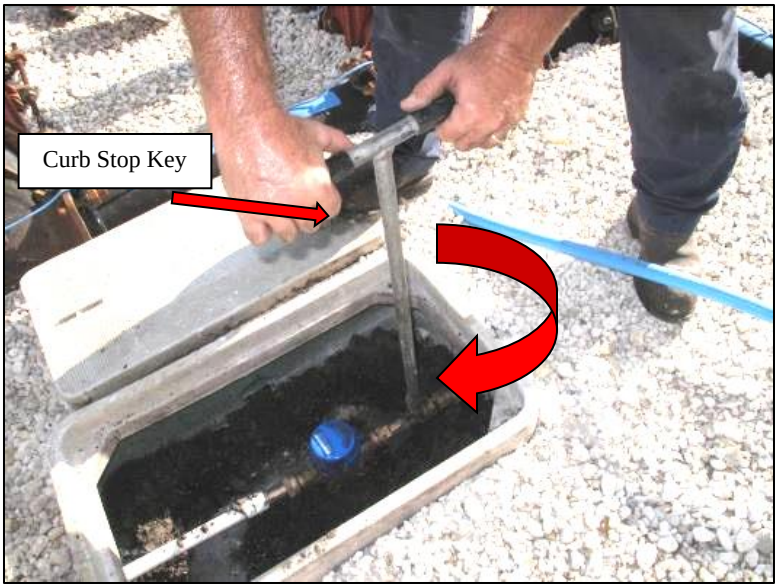


Figure 7. Closing curb stop with curb stop key

Figure 8. Closed curb stop

10. Loosen the meter couplings by using the meter wrenches. Remove the meter (see figure 9).

Figure 9. Removing meter using meter wrenches

11. After removing the meter, plug the house line by screwing a plug into the meter coupling on the house line meter coupling side (see figure 10).

Figure 10. House plug

12. Install the standpipe on the service line, and flush line (see figure 11)

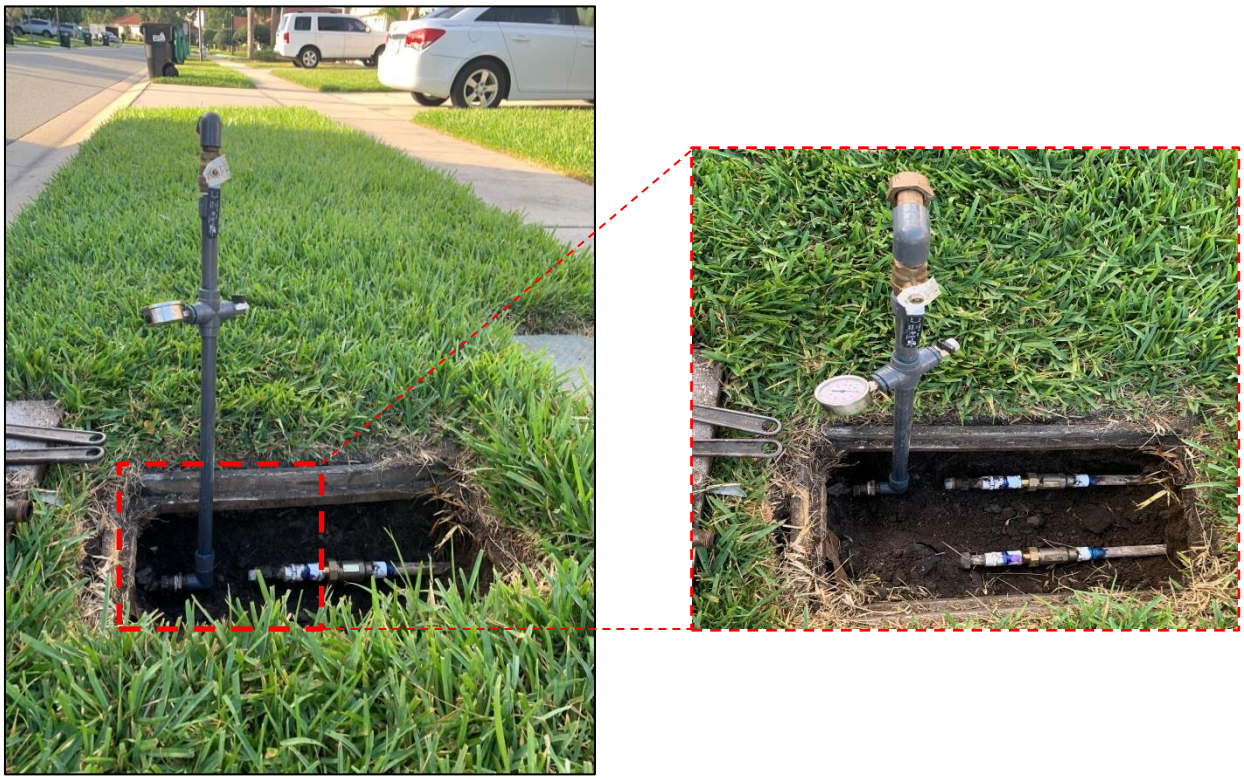


Figure 11. Standpipe installed in service line

i. Turn on curb stop using curb key, flush service, approximately for 1 minute. (see figure 12)

Figure 12. Flushing service

ii. Turn off curb stop, remove standpipe.

13. Insert the new meter with washers on each side of the meter and tighten the meter couplings using the meter wrenches. Be sure that the arrow on the meter points in the direction of the water flow, i.e., toward the house (see figure 13).

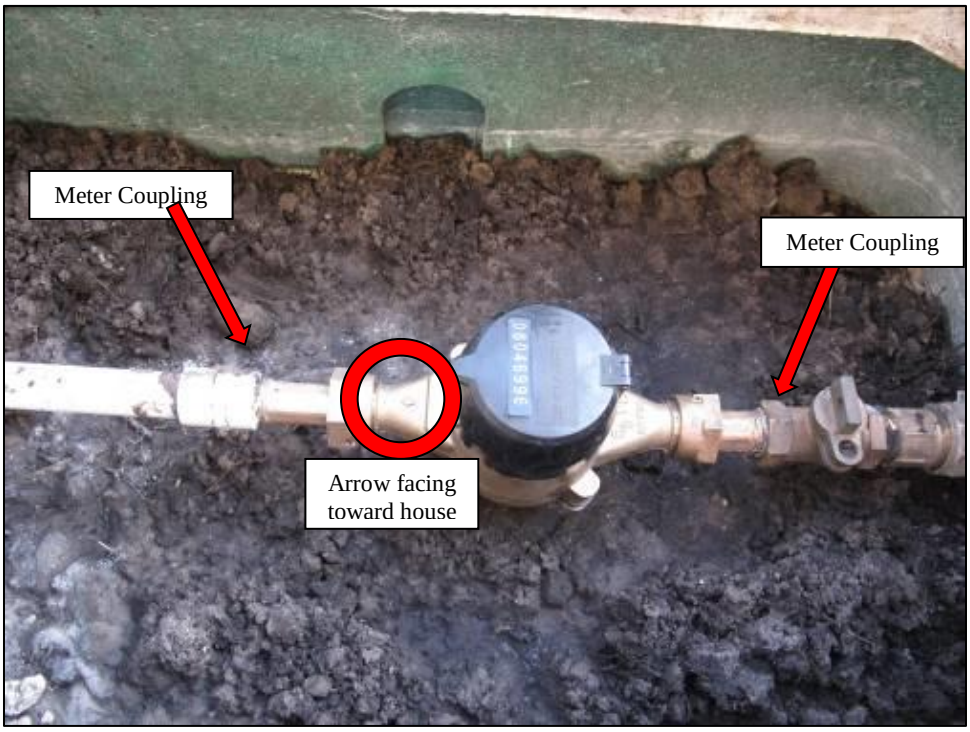


Figure 13. Meter couplings and direction of flow

14. Record new meter reading, but do not enter it in Maximo (see figure 14).

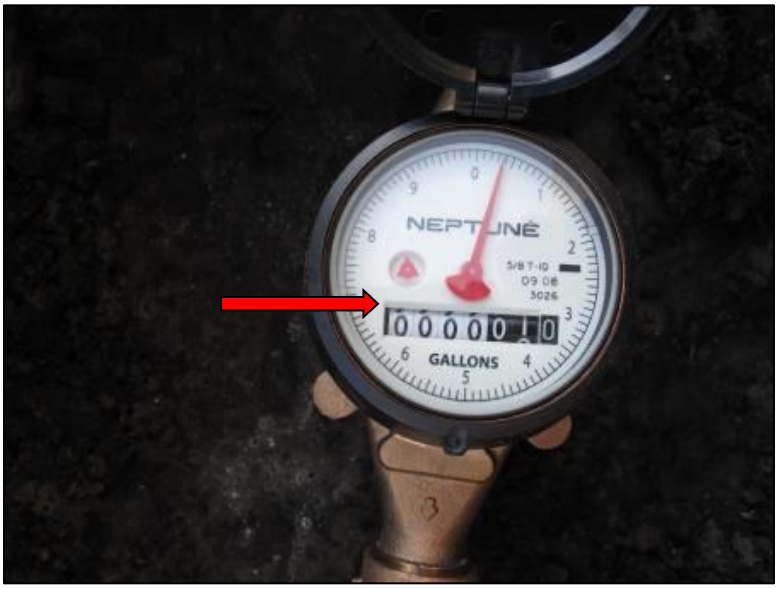


Figure 14. New meter reading

15. Open the nearest hose bib on the outside of the house and leave open.

16. Return to the meter box and open the curb stop slowly and flush for a minimum of 20 gallons. This process will flush the house line, extracting any loose particles or dirty water. Water should be clear and free of air in the lines (see figure 15).

Figure 15. Flushing house line

17. Close the hose bib.

NOTE: Latest meter reading is used and entered into Maximo so the customer is not billed 20 gallons.

18. Check the meter to see that a minimum of 20 gallons have registered, record reading and use for Maximo (see figure 16).

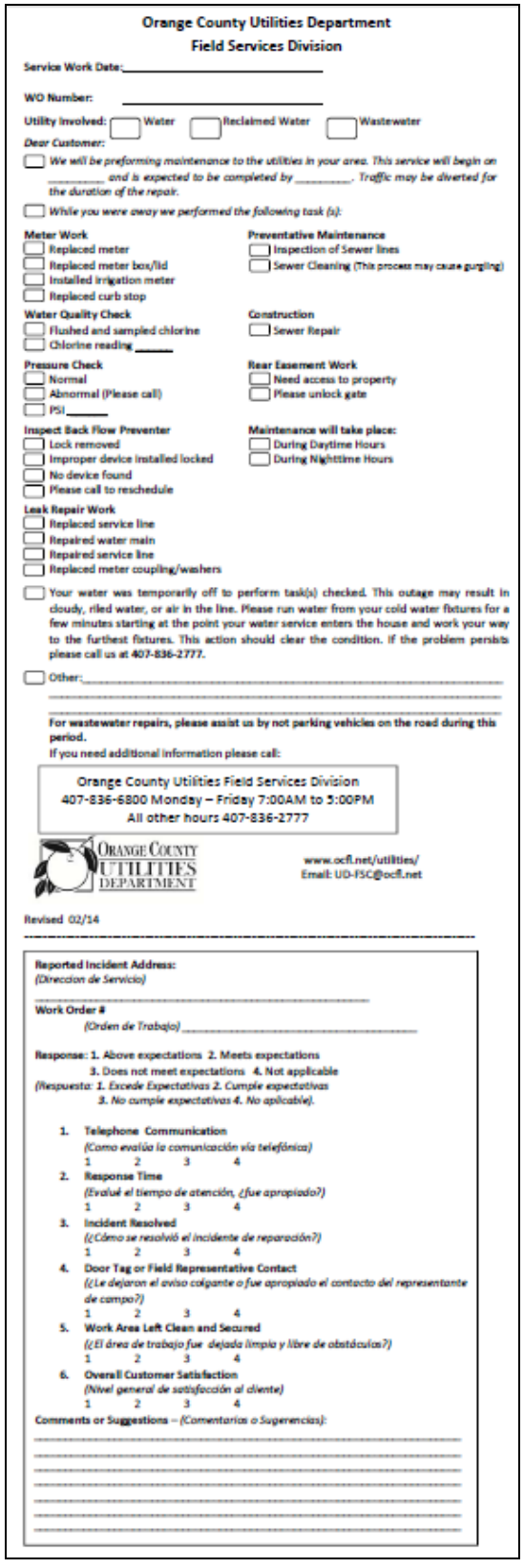
Figure 16. Meter reading after 20 gallons

19. Check the meter box for any leaks.

20. If leaks found, identify location of leak:
    a. Meter- Replace washers and/or couplings and tighten using meter wrenches.
    b. Curb stop – Tighten curb stop or couplings. If replacement is needed, a new work order must be generated. (Refer to Curb Stop Replacement SOP, # D-MS-02)
21. Notify the customer that the work has been completed and the water is back in service.
22. Any meters removed from the ground by field service personnel will be sent to the Orange County Utilities Meter Shop.
23. Fill out the Field Services Division Service Information door hanger and hand to customer for feedback purposes (see figures 17a through 17d). The following items should be checked/filled on card:
    a. Service Call Date
    b. Water
    c. Replaced Meter
    d. Please run water through more than one faucet in your residence/business until water runs clear
    e. Other - A note to customer instructing him/her to flush water until it is also free of air.
    f. Report Incident Address and include the work order number.

NOTE: The bottom section of the card is the return feedback section.

24. If customer is not home, leave the Field Services Division Service Information "door hanger" on customer's door after filling/checking out the information from step 23.



Orange County Utilities Department
Field Services Division

Service Work Date:_____

WO Number: _____

Utility Involved: ☐ Water ☐ Reclaimed Water ☐ Wastewater

Dear Customer:

☐ *We will be preforming maintenance to the utilities in your area. This service will begin on _____ and is expected to be completed by _____. Traffic may be diverted for the duration of the repair.*

☐ *While you were away we performed the following task (s):*

Meter Work
☐ Replaced meter
☐ Replaced meter box/lid
☐ Installed irrigation meter
☐ Replaced curb stop

Preventative Maintenance
☐ Inspection of Sewer lines
☐ Sewer Cleaning (This process may cause gurgling)

Water Quality Check
☐ Flushed and sampled chlorine
☐ Chlorine reading _____

Construction
☐ Sewer Repair

Pressure Check
☐ Normal
☐ Abnormal (Please call)
☐ PSI _____

Rear Easement Work
☐ Need access to property
☐ Please unlock gate

Inspect Back Flow Preventer
☐ Lock removed
☐ Improper device installed locked
☐ No device found
☐ Please call to reschedule

Maintenance will take place:
☐ During Daytime Hours
☐ During Nighttime Hours

Leak Repair Work
☐ Replaced service line
☐ Repaired water main
☐ Repaired service line
☐ Replaced meter coupling/washers

☐ Your water was temporarily off to perform task(s) checked. This outage may result in cloudy, riled water, or air in the line. Please run water from your cold water fixtures for a few minutes starting at the point your water service enters the house and work your way to the furthest fixtures. This action should clear the condition. If the problem persists please call us at **407-836-2777.**

☐ Other:_____

For wastewater repairs, please assist us by not parking vehicles on the road during this period.

If you need additional information please call:

Orange County Utilities Field Services Division
407-836-6800 Monday – Friday 7:00AM to 5:00PM
All other hours 407-836-2777

ORANGE COUNTY UTILITIES DEPARTMENT

www.ocfl.net/utilities/
Email: UD-FSC@ocfl.net

Revised 02/14

Reported Incident Address:
(Direccion de Servicio)
_____

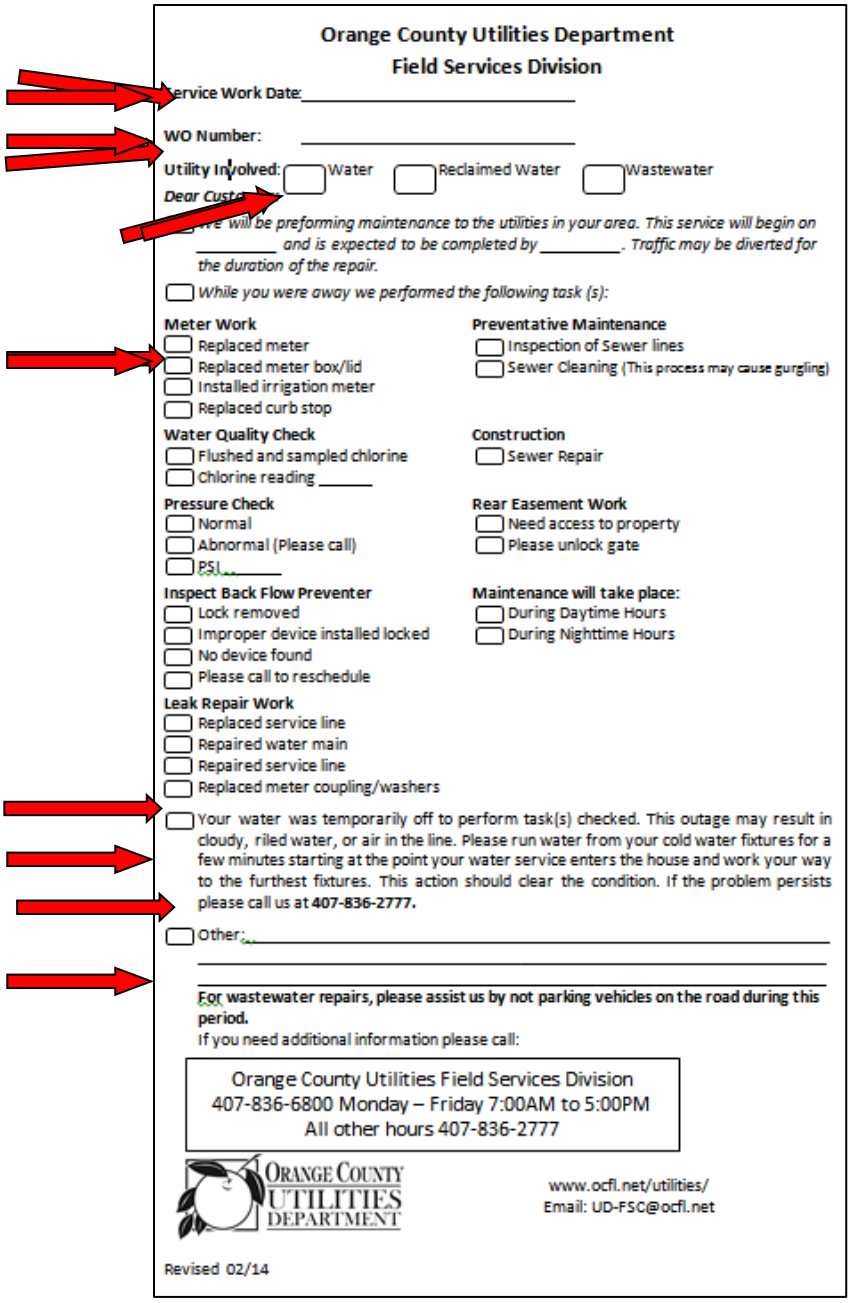
Work Order #
(Orden de Trabajo) _____

Response: 1. Above expectations 2. Meets expectations 3. Does not meet expectations 4. Not applicable
(Respuesta: 1. Excede Expectativas 2. Cumple expectativas 3. No cumple expectativas 4. No aplicable).

1. **Telephone Communication**
(Como evalúa la comunicación vía telefónica)
1 2 3 4
2. **Response Time**
(Evaluó el tiempo de atención, ¿fue apropiado?)
1 2 3 4
3. **Incident Resolved**
(¿Cómo se resolvió el incidente de reparación?)
1 2 3 4
4. **Door Tag or Field Representative Contact**
(¿Le dejaron el aviso colgante o fue apropiado el contacto del representante de campo?)
1 2 3 4
5. **Work Area Left Clean and Secured**
(¿El área de trabajo fue dejada limpia y libre de obstáculos?)
1 2 3 4
6. **Overall Customer Satisfaction**
(Nivel general de satisfacción al cliente)
1 2 3 4

Comments or Suggestions – *(Comentarios o Sugerencias):*
_____
_____
_____
_____
_____
_____
_____

Figure 17a. Field Services Division Service Information complete form



Orange County Utilities Department
Field Services Division

Service Work Date: _____

WO Number: _____

Utility Involved: ☐ Water ☐ Reclaimed Water ☐ Wastewater

Dear Custo

☐ *We will be preforming maintenance to the utilities in your area. This service will begin on _____ and is expected to be completed by _____. Traffic may be diverted for the duration of the repair.*

☐ *While you were away we performed the following task (s):*

Meter Work
- ☐ Replaced meter
- ☐ Replaced meter box/lid
- ☐ Installed irrigation meter
- ☐ Replaced curb stop

Water Quality Check
- ☐ Flushed and sampled chlorine
- ☐ Chlorine reading _____

Pressure Check
- ☐ Normal
- ☐ Abnormal (Please call)
- ☐ PSI _____

Inspect Back Flow Preventer
- ☐ Lock removed
- ☐ Improper device installed locked
- ☐ No device found
- ☐ Please call to reschedule

Leak Repair Work
- ☐ Replaced service line
- ☐ Repaired water main
- ☐ Repaired service line
- ☐ Replaced meter coupling/washers

Preventative Maintenance
- ☐ Inspection of Sewer lines
- ☐ Sewer Cleaning (This process may cause gurgling)

Construction
- ☐ Sewer Repair

Rear Easement Work
- ☐ Need access to property
- ☐ Please unlock gate

Maintenance will take place:
- ☐ During Daytime Hours
- ☐ During Nighttime Hours

☐ Your water was temporarily off to perform task(s) checked. This outage may result in cloudy, riled water, or air in the line. Please run water from your cold water fixtures for a few minutes starting at the point your water service enters the house and work your way to the furthest fixtures. This action should clear the condition. If the problem persists please call us at **407-836-2777.**

☐ Other: _____

For wastewater repairs, please assist us by not parking vehicles on the road during this period.

If you need additional information please call:

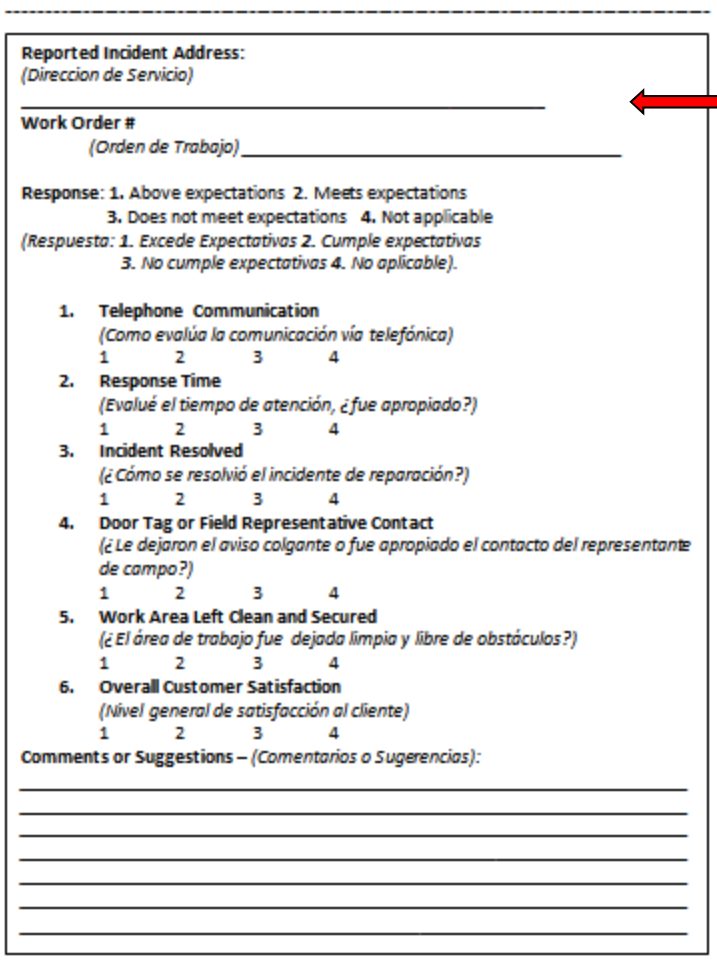
Orange County Utilities Field Services Division
407-836-6800 Monday – Friday 7:00AM to 5:00PM
All other hours 407-836-2777

ORANGE COUNTY UTILITIES DEPARTMENT

www.ocfl.net/utilities/
Email: UD-FSC@ocfl.net

Revised 02/14

Figure 17b. Field Services Division Service Information top section



Reported Incident Address:
(Direccion de Servicio)

_____

Work Order #
(Orden de Trabajo) _____

Response: **1.** Above expectations **2.** Meets expectations
3. Does not meet expectations **4.** Not applicable
*(Respuesta: **1.** Excede Expectativas **2.** Cumple expectativas*
*3. No cumple expectativas **4.** No aplicable).*

1. **Telephone Communication**
   (Como evalúa la comunicación vía telefónica)
   1 2 3 4
2. **Response Time**
   (Evalué el tiempo de atención, ¿fue apropiado?)
   1 2 3 4
3. **Incident Resolved**
   (¿Cómo se resolvió el incidente de reparación?)
   1 2 3 4
4. **Door Tag or Field Representative Contact**
   (¿Le dejaron el aviso colgante o fue apropiado el contacto del representante de campo?)
   1 2 3 4
5. **Work Area Left Clean and Secured**
   (¿El área de trabajo fue dejada limpia y libre de obstáculos?)
   1 2 3 4
6. **Overall Customer Satisfaction**
   (Nivel general de satisfacción al cliente)
   1 2 3 4

Comments or Suggestions – *(Comentarios o Sugerencias):*

_____
_____
_____
_____
_____
_____
_____

Fill in customer's address and in addition the work order number. **NOTE**: This is the return part (feedback) of the Door Hanger.

Figure 17c. Field Services Division Service Information bottom section front

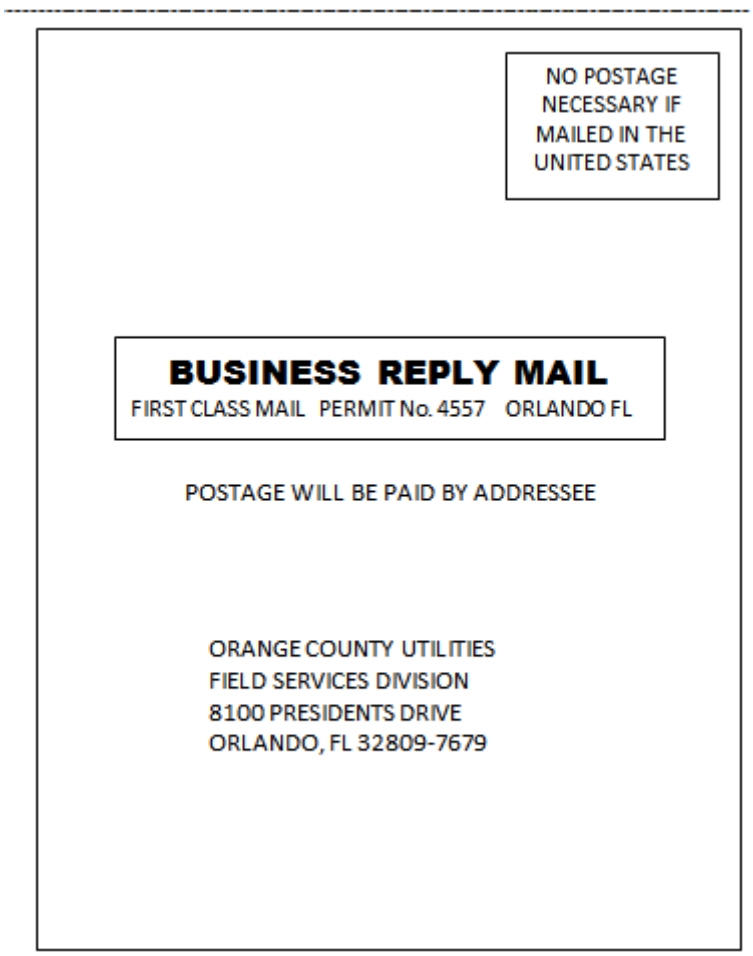


Figure 17d. Field Services Division Service Information bottom section back

25. Complete Syclo Work Order:
    a. Add/Edit screen - From the drop down menu choose the new meter installed and the quantity below.
    b. Select the new meter number from the value list and click finish (see figure 18).

NOTE: By adding the new meter, the new meter number will auto populate in the Field Activity Reporting screen.

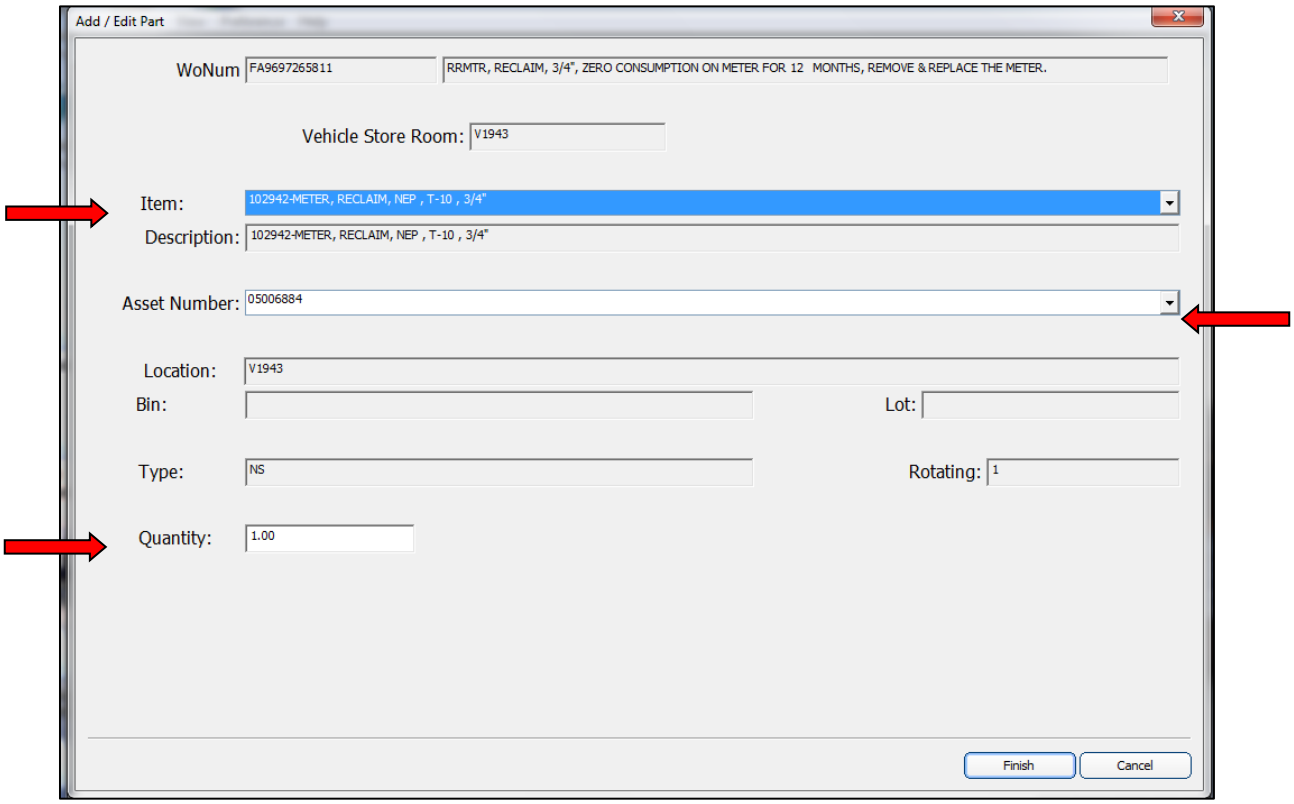


Figure 18. Syclo Add/Edit

c. Fill the Field Activity Reporting screen :

i. Fill in the old meter reading in the first Register 1 Reading box

ii. Find the new meter serial number in Enter New Meter box and fill in the new meter reading directly under it, in the second Register 1 Reading box.

iii. Click “Finish” in the bottom right hand corner of the screen when complete (see figure 19).

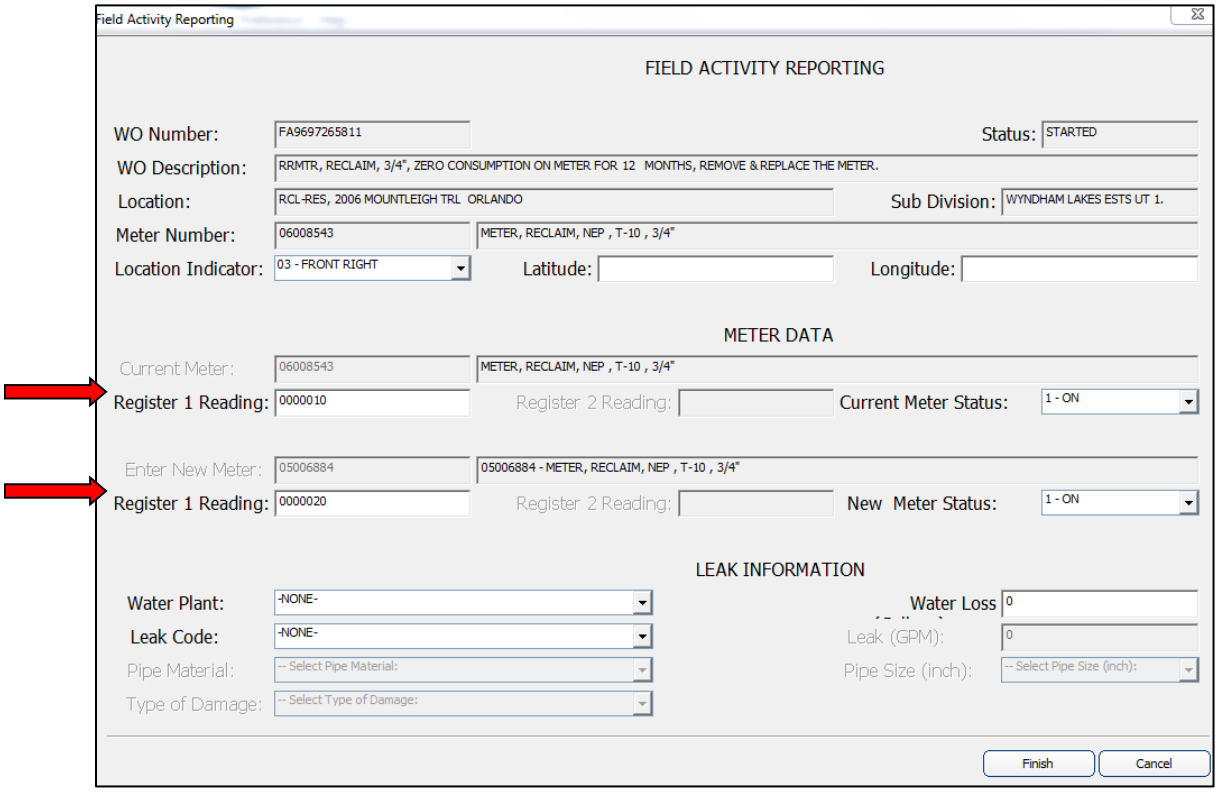


Figure 19. Field Activity Reporting

.

d. Complete the View Work Order Details screen:

i. Input your notes in the Work Log tab

ii. Cross reference the backflow information in the backflow tab (see figure 20)

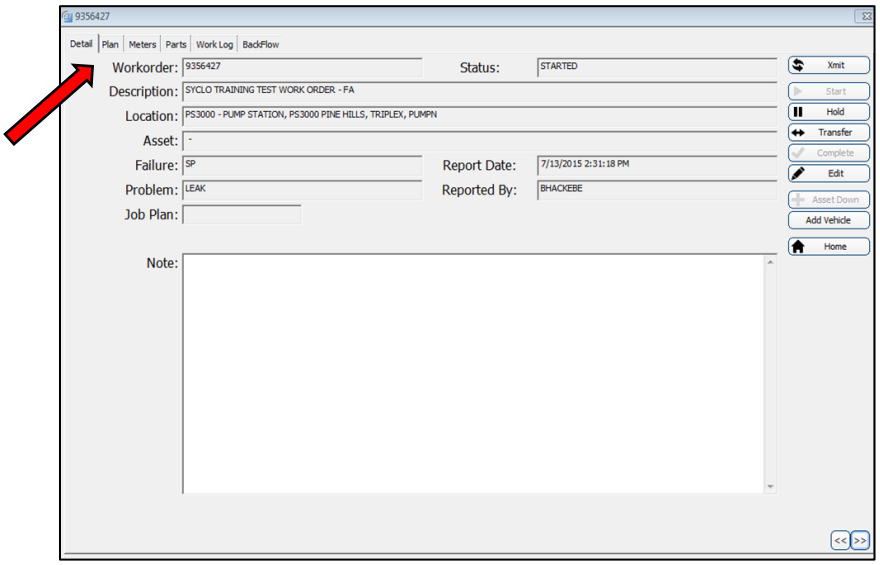


Figure 20. Syclo Work Order Details

e. Using the information previously recorded about the backflow device fill in the make/model, serial number, size and location. Enter information you recorded in its specific location (see figure 21).

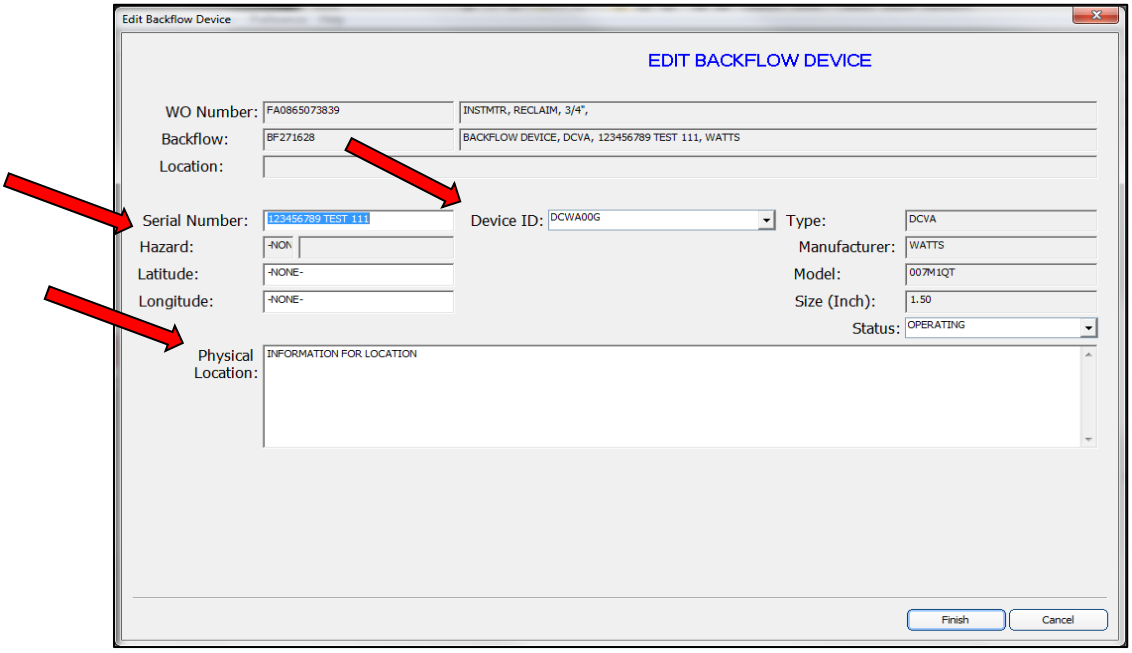


Figure 21. Data entered

f. Completion Info screen – From the drop down menus, click on the following for: (see figure 22).

i. Failure – Service point

ii. Problem – Replace Meter

iii. Cause – Broken or High Mileage on Meter

iv. Remedy – Complete

NOTE: Write in any additional comments or notes such as problems encountered, extra time needed, etc.

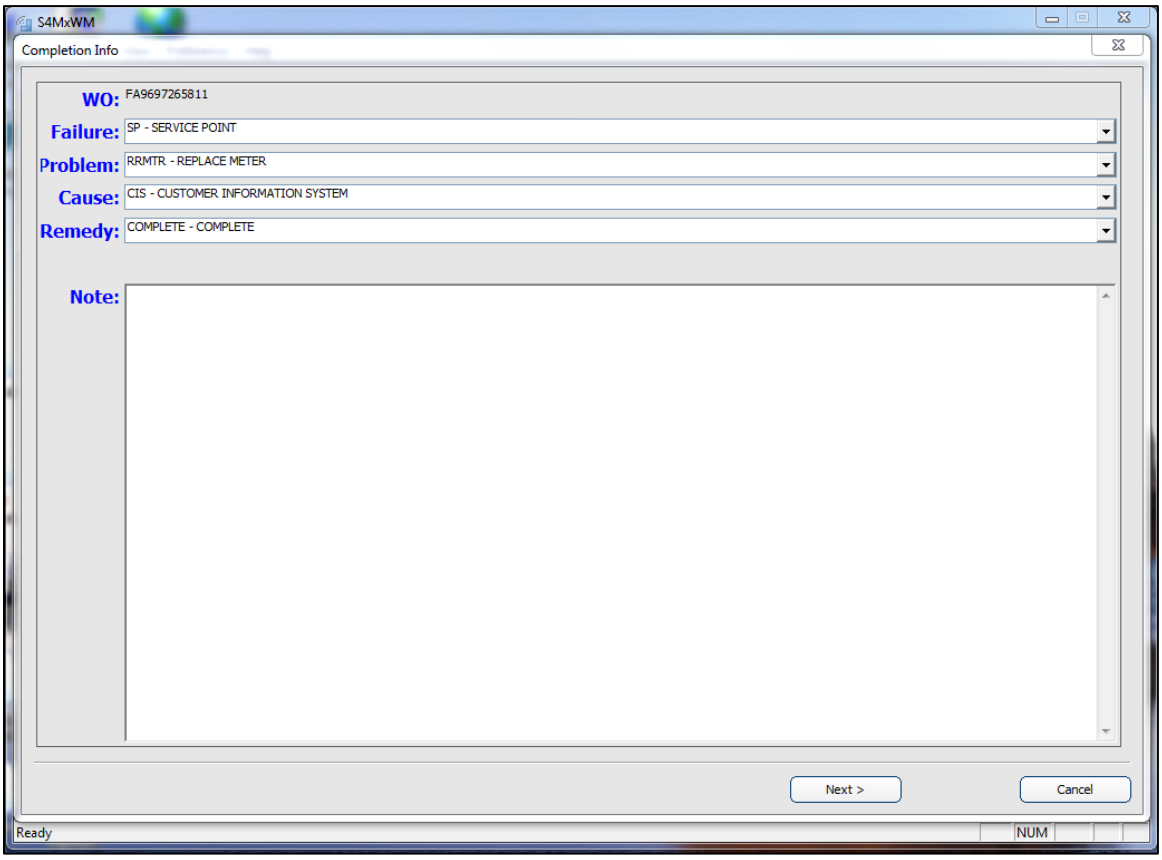


Figure 22. Syclo Completion info

g. Reference SOP# FS-CT-05 to complete WO.

REVISION LOG:

Revision Date	Section	Description	Author's Initials	Section Manager or Division Manager Approval
9/2/2009		New SOP format and enhanced content based on previous SOP # 03-M-03, "Meter Change-Outs"	N/A	N/A
5/24/2012	Header	Updated title to Field Services from Water Distribution	N/A	N/A
	A. Purpose	Minor wording and formatting edits		
	B. References	Edited Formatting of references, removed nonexistent SOP from list.		
	H.4 Procedure	Added Figure 3		
	Attachment	Added Checklist attachment		
	All	Updated to meet new format requirements.		
2/28/2013	Header	Updated Orange County Government picture.	N/A	N/A
	H.8.c and NOTE	Removed reference to nonexistent SOPs.		
	H.24	Removed reference to nonexistent SOPs.		
2/20/2014	A.	Updated Purpose	N/A	N/A
	B.	Updated References		
	C.	Updated Skills		
	F.	Updated Forms		
	G.	Updated Safety		
	H. 3	Moved vehicle parking to the safety section.		
	H.	Removed references to SOP # D-CT-02, Maximo Mobile Work Management (Syclo) Use and SOP # D-CT-03, "Maximo Work Order Procedures. They do not exist.		
	H. 19	Combined a, b and c into 1 sub step.		
	H. 23.a	Broke a step into subsections to make it easier to follow.		

1/06/16	B.2.	Removed an incorrect reference	N/A	N/A
	H.7	Added new image		
	All	Reformatted Figures		
7/9/2019	H	Added figures 11-13, 15-16	CJ	JRS
7/9/2019	H. 24	Added Section 24	GM	JRS
	H. 12	Revised section 12		
	H.24	Note added		

Revised By:	**SME:**	**Section Manager Approval & Date:**
Chad Swann	Pete Stevenson	Digitally signed by Robert J. Dudas DN: cn=Robert J. Dudas, o=Water Distribution, ou=1328, email=Bob.Dudas@ocfl.net, c=US Date: 2014.03.20 10:42:25 -04'00'

Attachment 1

Door Hanger

Orange County Utilities Department
Field Services Division

Service Work Date:_____

WO Number: _____

Utility Involved: ☐ Water ☐ Reclaimed Water ☐ Wastewater

Dear Customer:

☐ *We will be preforming maintenance to the utilities in your area. This service will begin on _____ and is expected to be completed by _____. Traffic may be diverted for the duration of the repair.*

☐ *While you were away we performed the following task (s):*

Meter Work
☐ Replaced meter
☐ Replaced meter box/lid
☐ Installed irrigation meter
☐ Replaced curb stop

Preventative Maintenance
☐ Inspection of Sewer lines
☐ Sewer Cleaning (This process may cause gurgling)

Water Quality Check
☐ Flushed and sampled chlorine
☐ Chlorine reading _____

Construction
☐ Sewer Repair

Pressure Check
☐ Normal
☐ Abnormal (Please call)
☐ PSI _____

Rear Easement Work
☐ Need access to property
☐ Please unlock gate

Inspect Back Flow Preventer
☐ Lock removed
☐ Improper device installed locked
☐ No device found
☐ Please call to reschedule

Maintenance will take place:
☐ During Daytime Hours
☐ During Nighttime Hours

Leak Repair Work
☐ Replaced service line
☐ Repaired water main
☐ Repaired service line
☐ Replaced meter coupling/washers

☐ Your water was temporarily off to perform task(s) checked. This outage may result in cloudy, riled water, or air in the line. Please run water from your cold water fixtures for a few minutes starting at the point your water service enters the house and work your way to the furthest fixtures. This action should clear the condition. If the problem persists please call us at 407-836-2777.

☐ Other:_____

For wastewater repairs, please assist us by not parking vehicles on the road during this period.

If you need additional information please call:

Orange County Utilities Field Services Division
407-836-6800 Monday – Friday 7:00AM to 5:00PM
All other hours 407-836-2777

ORANGE COUNTY UTILITIES DEPARTMENT

www.ocfl.net/utilities/
Email: UD-FSC@ocfl.net

Revised 02/14

Reported Incident Address:
(Direccion de Servicio)
_____

Work Order #
(Orden de Trabajo) _____

Response: 1. Above expectations 2. Meets expectations 3. Does not meet expectations 4. Not applicable
(Respuesta: 1. Excede Expectativas 2. Cumple expectativas 3. No cumple expectativas 4. No aplicable).

1. **Telephone Communication**
   (Como evalúa la comunicación vía telefónica)
   1 2 3 4
2. **Response Time**
   (Evaluó el tiempo de atención, ¿fue apropiado?)
   1 2 3 4
3. **Incident Resolved**
   (¿Cómo se resolvió el incidente de reparación?)
   1 2 3 4
4. **Door Tag or Field Representative Contact**
   (¿Le dejaron el aviso colgante o fue apropiado el contacto del representante de campo?)
   1 2 3 4
5. **Work Area Left Clean and Secured**
   (El área de trabajo fue dejada limpia y libre de obstáculos?)
   1 2 3 4
6. **Overall Customer Satisfaction**
   (Nivel general de satisfacción al cliente)
   1 2 3 4

Comments or Suggestions -- *(Comentarios o Sugerencias):*
_____
_____
_____
_____
_____
_____
_____

ORANGE COUNTY UTILITIES **FIELD SERVICES DIVISION** **Standard Operating Procedure**	
Procedure: **Piped Meter Box Installation (5/8" to 1") with Existing Service**	**Number:** **D-MS-06**
Effective Date: **21 January 2010**	**Revision Date:** **9 July 2019**

A. PURPOSE:

The primary function of a piped meter box is to enclose one or two meters, which are used to measure and display the amount of water passing through a service point for a particular customer. The piped meter box is connected directly to the service line and the box is fully enclosed. The box is installed in the ground, and the ground around the box is compacted for stability.

The meters and boxes are typically replaced to update an old system, elevate a meter that has settled in the ground, and/or the meters have become difficult to read by the Meter Reader.

This procedure will provide specific guidelines and steps to properly install a piped meter box with an existing service.

B. REFERENCES:

1. M6 Water Meters – Selection, Installation, Testing, and Maintenance. 5th Edition. Denver: American Water Works Association, 2012.
2. Orange County Utilities Safety and Health Manual
3. Orange County Utilities, Field Services Division Standard Operating Procedures (SOPs):
   a. D-MS-02 Curb Stop Replacement
   b. FS-CT-01 GIS - Locating Addresses and Assets
   c. D-MS-04 Meter Leaks
   d. D-MS-05 Meter Replacement (5/8” to 1”)
   e. D-PL-03 Connecting Polyethylene Service
   f. D-MS-08 Service Line Repair
4. Water Distribution Systems Operation and Maintenance. 7th edition. Sacramento: CSU, 2018.

C. SKILL AREA:

This section refers to the skills required for the Orange County Utilities (OCU) Skills Testing. The objective during the training of a specialist is to use the SOPs specific to a skill area in preparation for learning of a skill and the test.

1. Meter and Services

D. PERSONNEL:

1. Trained Field Specialist or above

E. EQUIPMENT:

1. Equipment
    a. Personal protective equipment (PPE):
        i. Protective eyewear
        ii. Steel toed shoes
        iii. Safety gloves
        iv. Reflective vest
    b. Hand pump
    c. Line plug
2. Materials
    a. Compression by compression coupling
    b. Curb stops
    c. Joint Compound/Teflon Tape
    d. Meters 5/8" to 1"
    e. Piped Meter Box
    f. Polyethylene tubing
    g. PVC Fitting
    h. Brass Fittings
    i. Rubber Washers
    j. Safety cones
    k. Thread by compression 90º elbow
    l. U-Pipe Branch
3. Tools
    a. Adjustable Wrench
    b. Crimper
    c. Curb stop key
    d. Flat head screwdriver
    e. Hand shovel
    f. Meter box lid lifter
    g. Meter Wrenches
    h. Pipe bar
    i. PVC/Poly cutter
    j. Socket wrench
    k. Standpipe

F. FORMS:

1. "Field Services Information Card" (Attachment 1)
2. Request for Restoration form (Attachment 2)
3. SOP Checklist / Job Plan (Attachment 3)
4. Double service connection on right of way Image (Attachment 4)
5. Double domestic and reclaimed connection on right of way (Attachment 5)
6. Single service connection meters (Attachment 6)

G. SAFETY:

1. General Safety:
    a. All employees must be familiar with the Orange County Utilities safety policies as outlined in the Orange County Utilities Health and Safety Plan.
    b. Water Distribution Systems contains numerous potential hazards. Improper operation of equipment can result in damage to equipment and/or serious injury to personnel.
    c. Employees are required to perform assigned tasks in a safe and responsible manner and wear appropriate personal protective equipment (PPE) at all times.
2. Operational Safety:
    a. All field personnel should be careful and aware of the following potential hazards:
        i. Traffic
        ii. Animals (i.e. snakes, insects, mammals)
        iii. Poisonous plants
        iv. Other utility lines (gas, electrical, etc.)
    b. To some degree, all field personnel are involved in the manual handling and lifting of materials. The types of injuries that can potentially result from these activities vary, and include back injuries, hernias and sprains. These injuries can be minimized by practicing proper handling, digging, and lifting techniques as well as by using equipment properly. (i.e. shovels, pry bars, and tools)
    c. Vehicle parking while performing assigned tasks needs to address your own personal safety and the safety of the public. Your vehicle needs to be parked with the flow of traffic; safety flashers need to be on; safety cones need to be placed at the front and rear of the vehicle at a minimum.

Figure 1. Vehicle parking

d. Meter jumper cables will be required if both the house line and service line are electrically conductive, such as galvanized iron or copper. Some house lines have electrical wiring grounded to the water lines and may cause a shock to field personnel who are performing this procedure. If the house and service lines are both electrically conductive, utilize meter jumper cables as a precautionary measure. Clamp one end of the meter jumper cable to the service line, and the other end to the house line. This precaution will prevent potentially harmful electric shock to the field specialist. (see Figures 2-4 below for meter jumper cable configuration).

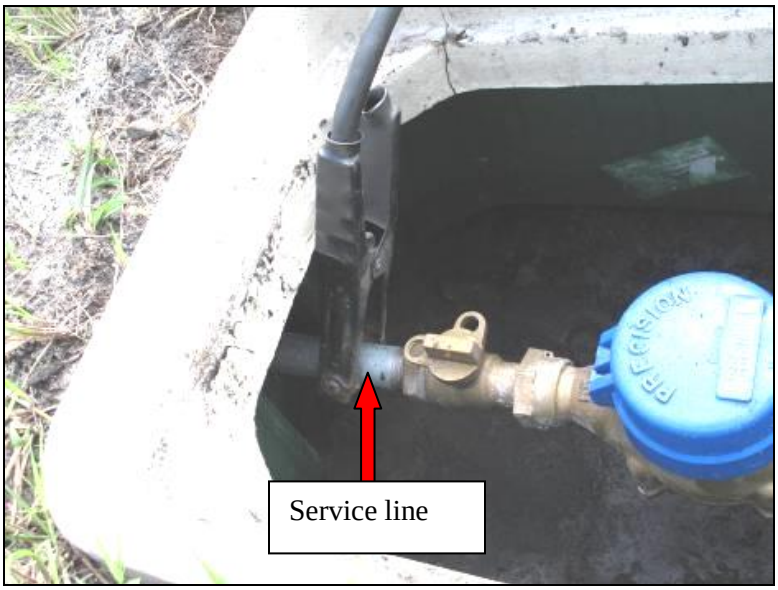


Figure 2. One end of jumper cable clamped on service line

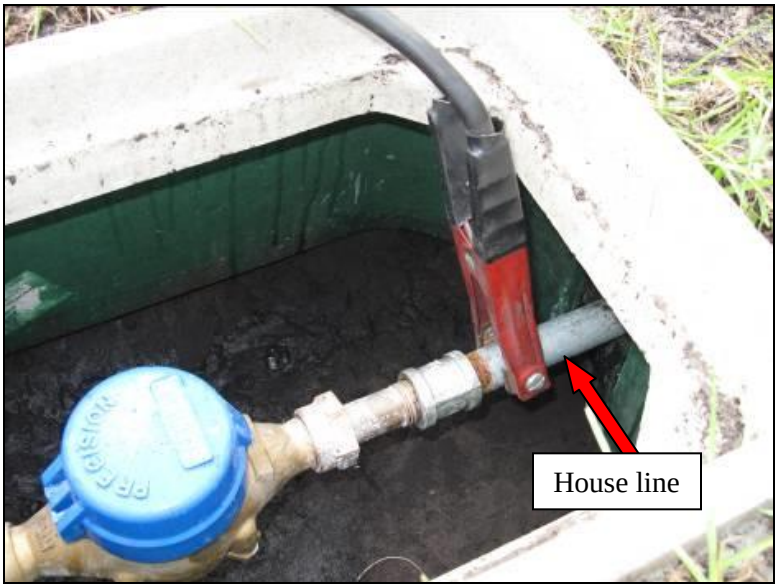


Figure 3. The other end of jumper cable clamped on house line

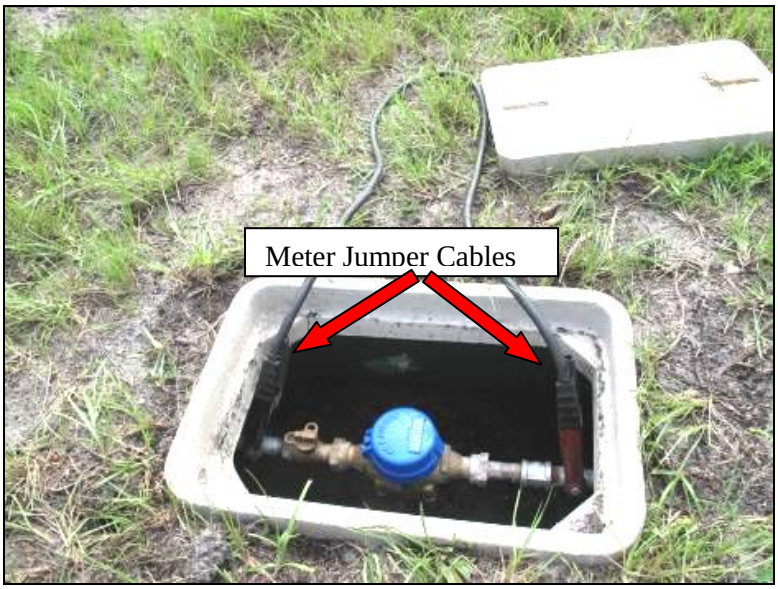


Figure 4. Full meter jumper cable configuration

H. PROCEDURE:

1. Review the Maximo work order.
2. Use the Geographic Information System (GIS) software on your laptop to obtain the address and location of meter and service of the property or house (see Figure 5 and Refer to FS-CT-01, GIS – Locating Addresses and Assets.)

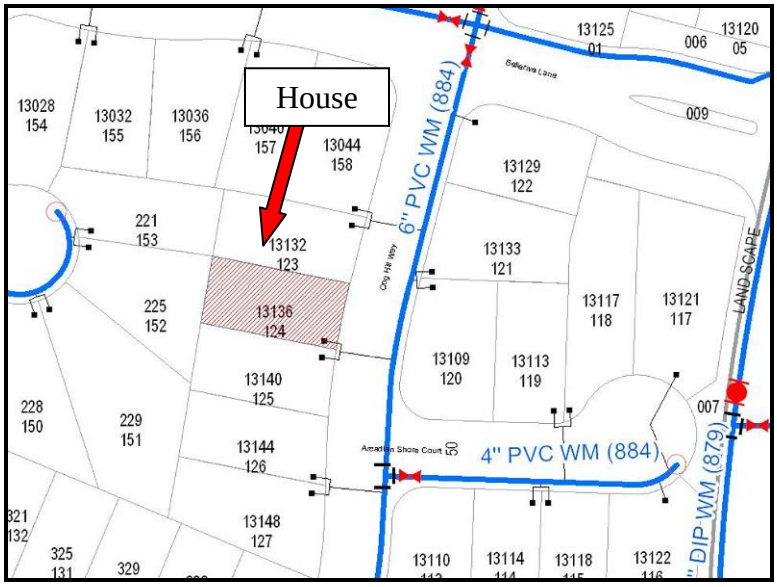


Figure 5. GIS

3. Review Standard drawings and specifications for meter installation based on particular configuration found. For a clearer image view the attachments in the last pages of the SOP. (see Figures 6a-6g)

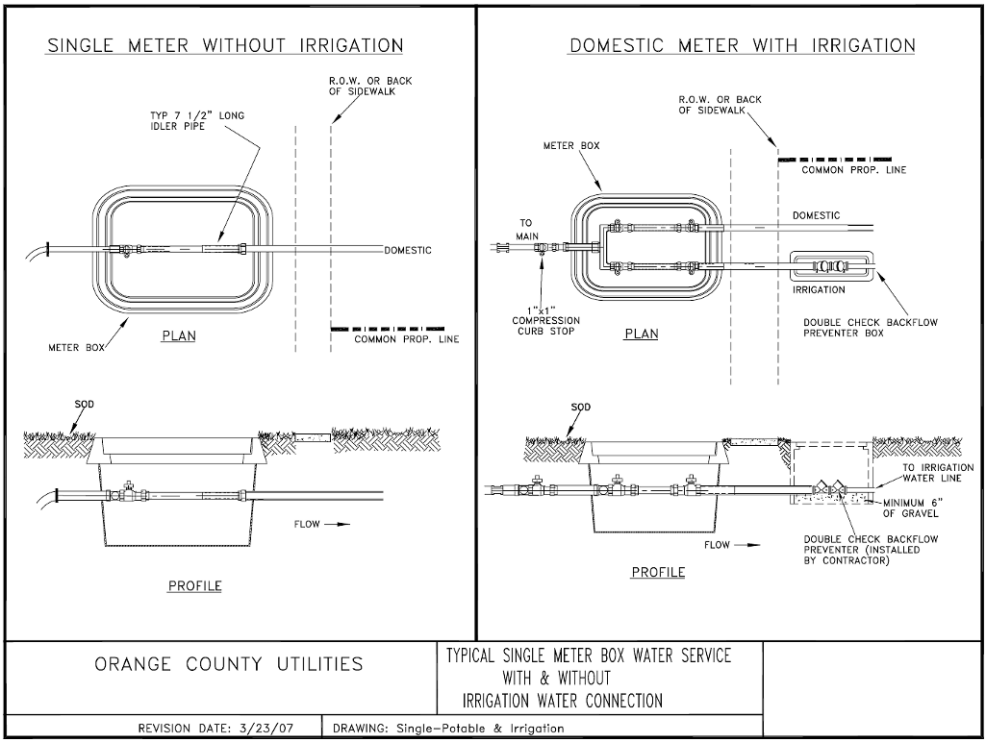


Figure 6a. Double service connection on right of way

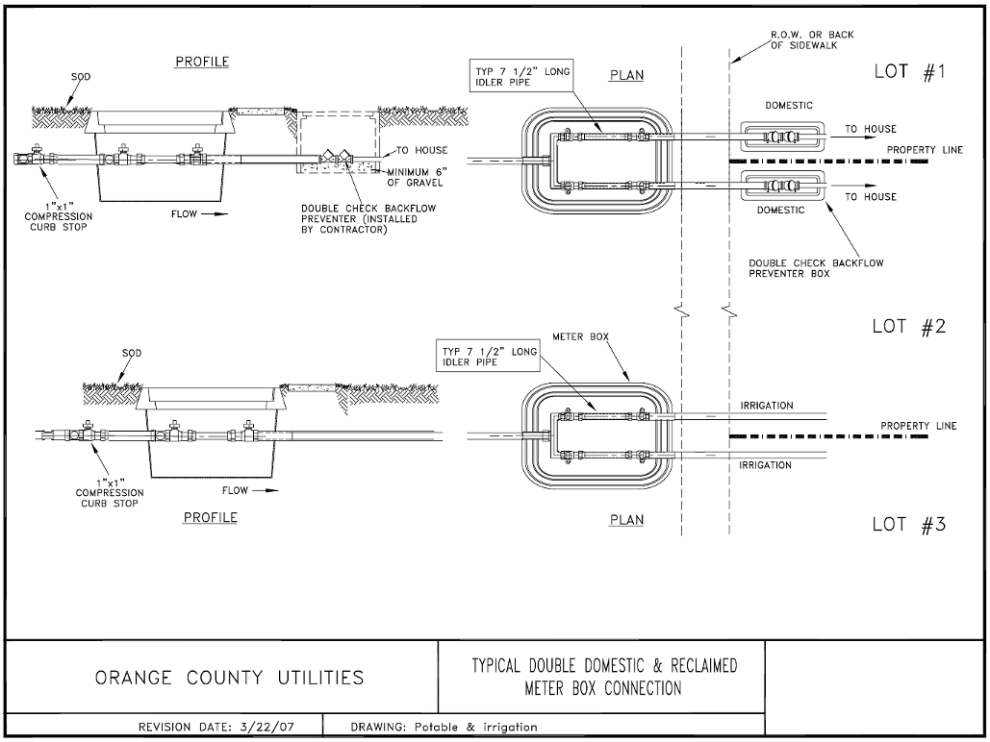


Figure 6b. Double domestic and reclaimed connection on right of way

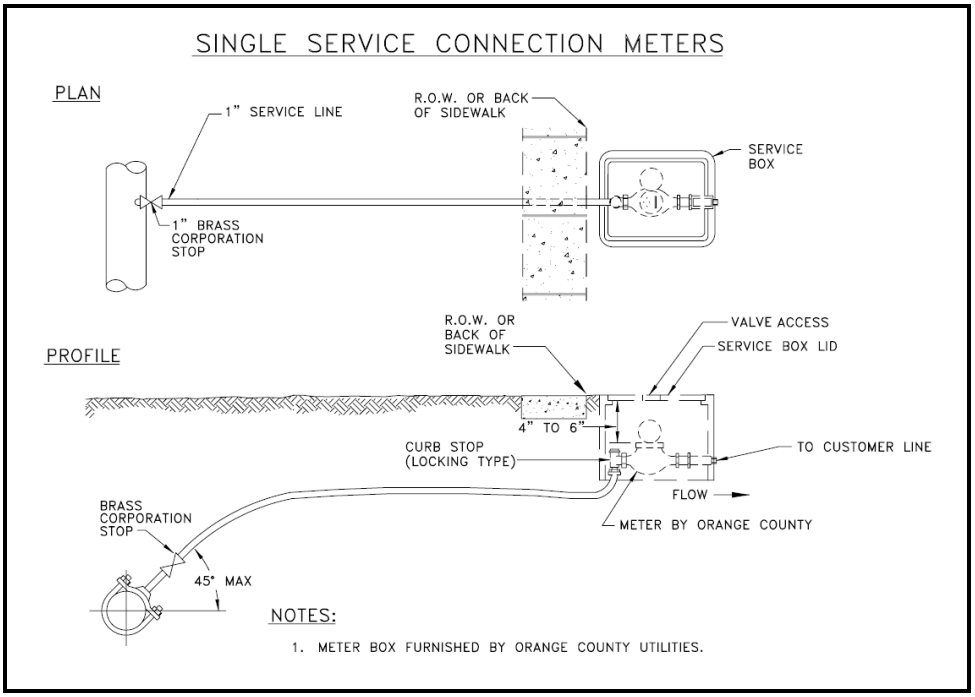


Figure 6c. Single service connection meters

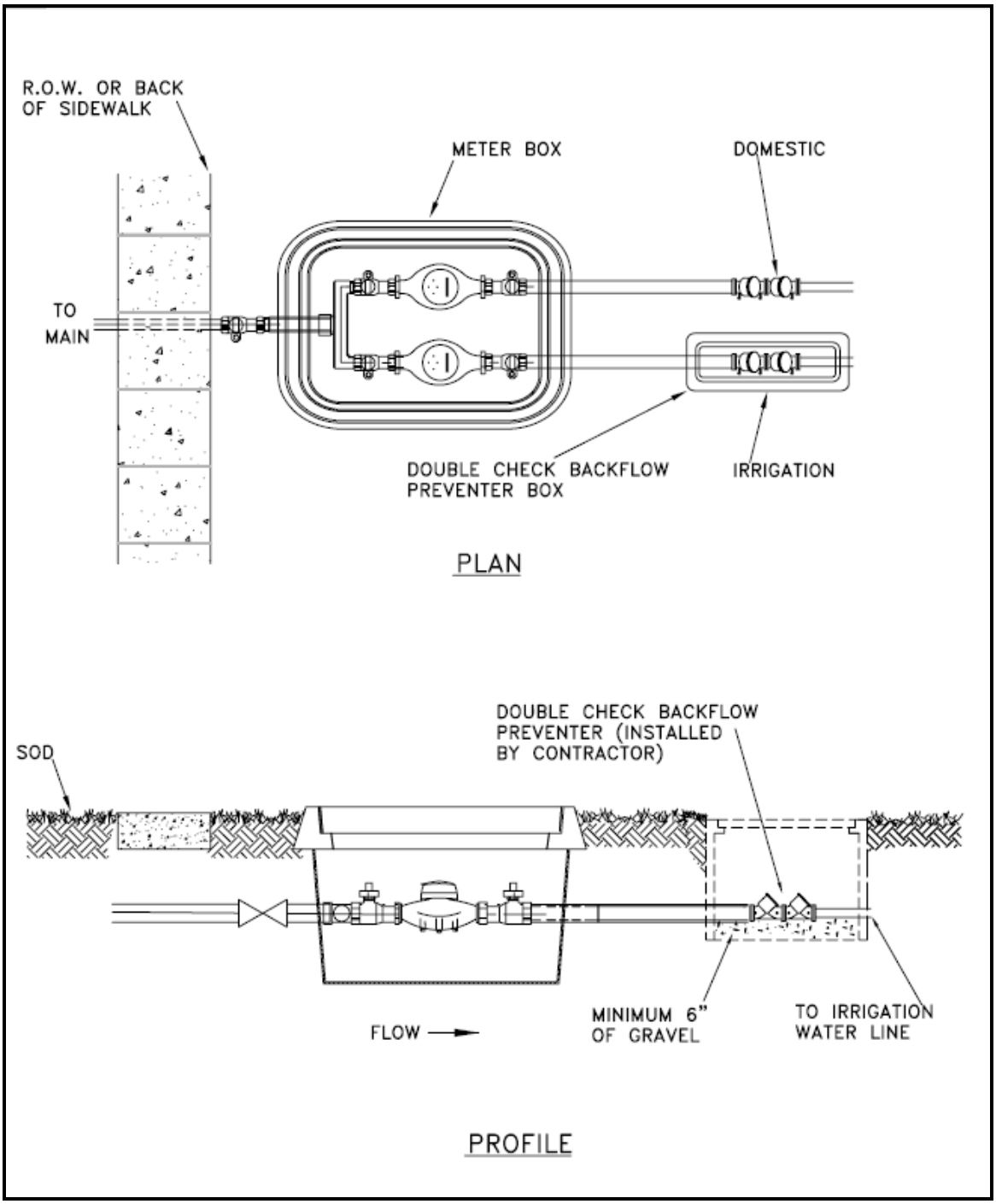


Figure 6d. Double service connection, meter box on easement

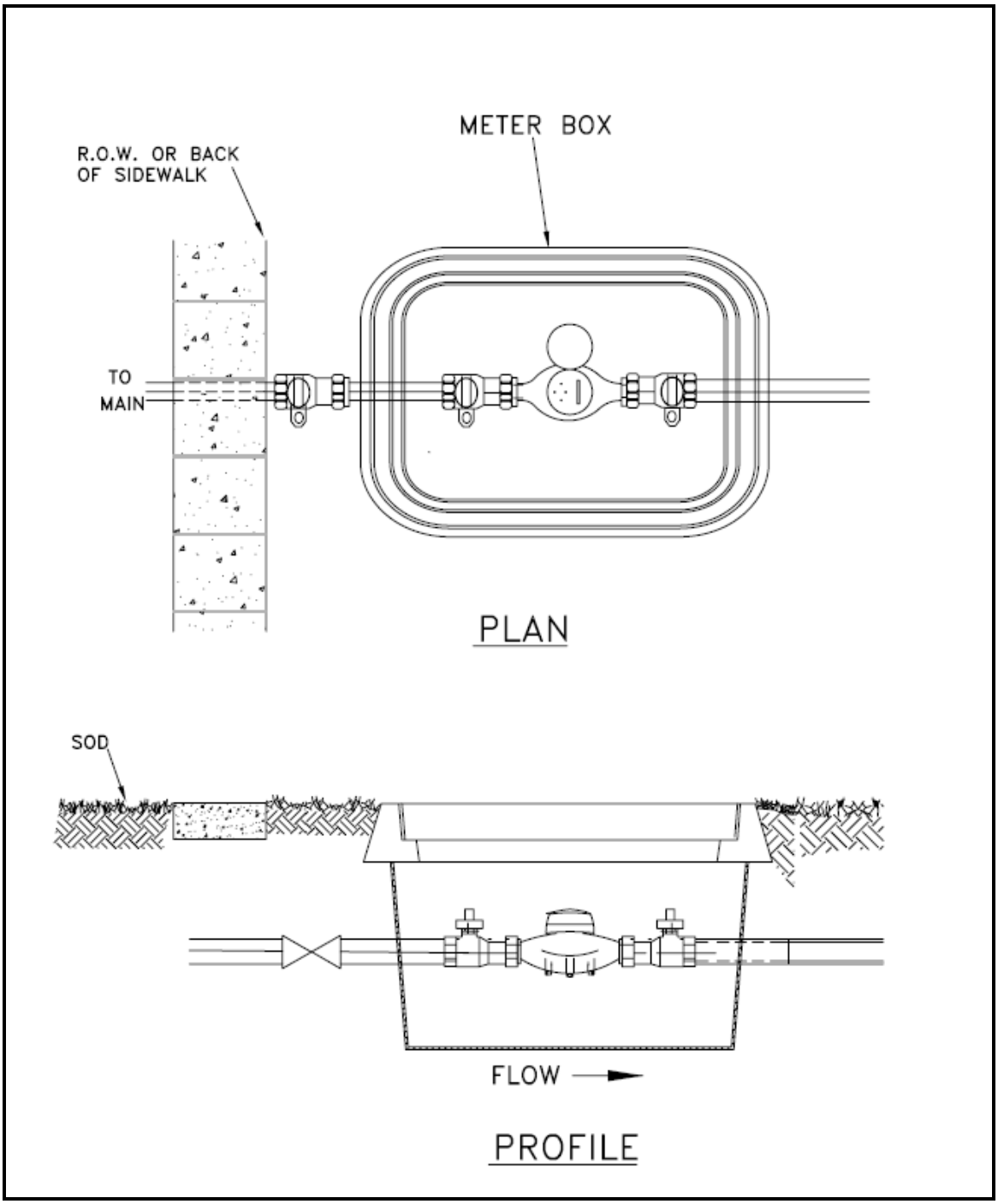


Figure 6e. Single service connection on easement

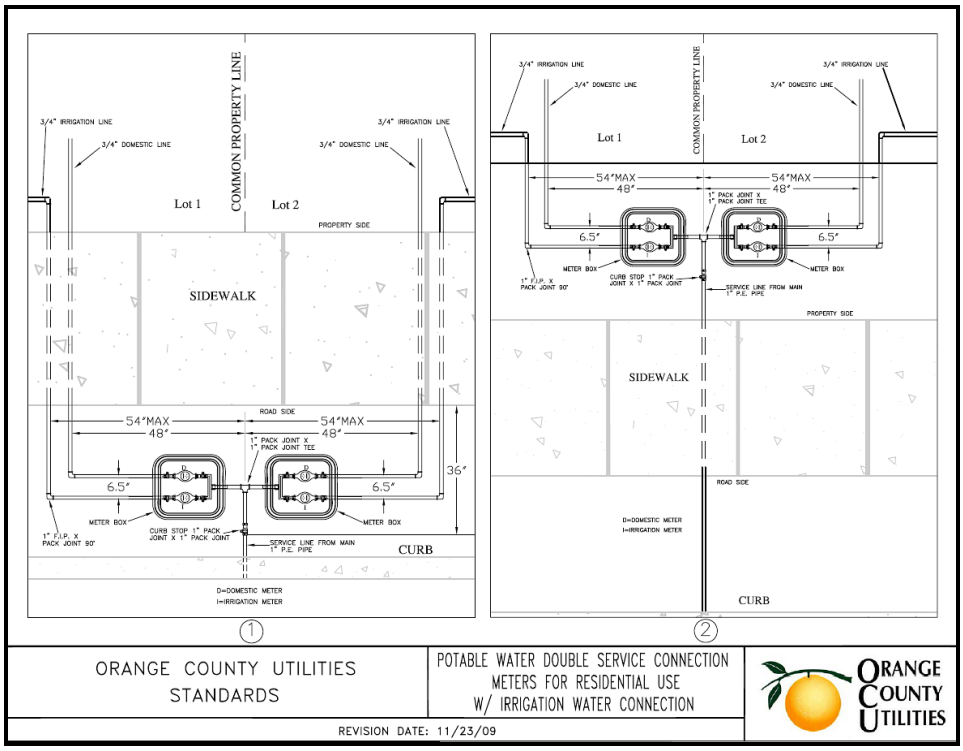


Figure 6f. Horizontal Double Service Meter Placement

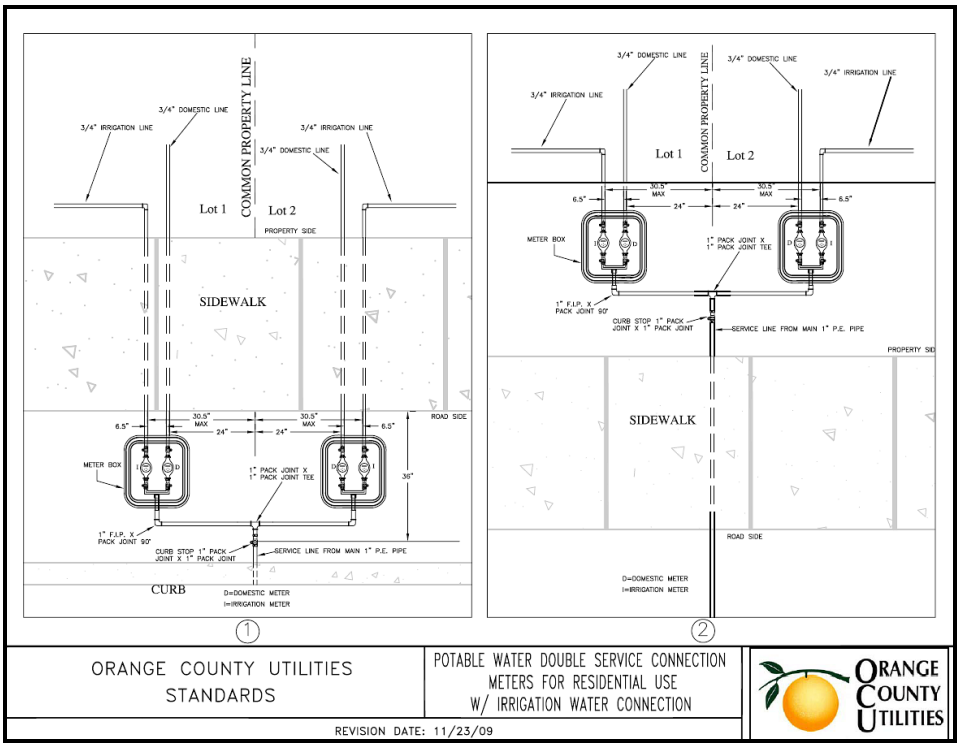


Figure 6g. Vertical Double Service Meter Placement

4. Locate and remove the meter lid using meter box lid lifter. (see Figure 7)

Figure 7. Meter Lid

5. Using information from the Maximo work order, verify the meters being serviced by reading the serial numbers from the meter register lids. (see Figure 8)

Figure 8. Meter register number

6. Notify the customer that the water service will be interrupted for a piped meter box installation.
   a. If customer agrees, go to **step H.7.**
   b. If customer requests a delay of about 15 minutes or so because someone is taking a shower or a clothes/dishwasher is in operation, tell the customer you will return in approximately 15 minutes. Use that time to set up and prepare for the job. When the agreed upon time has passed, inform the customer that water service will be interrupted, and go to **step H.7.**

c. If the customer requires more than 15 minutes before the water can be shut off, inform the customer that you will reschedule the job. Change the Maximo work order status to "On Hold".

d. If the customer is not at home, look at the water meter.

   i. If the water meter is not running, i.e., no water is being consumed, go to **step H.7.**

   ii. If the meter's low-flow indicator is moving very slowly, this indicates a leak in the customer's house line or in the house itself. Try to determine where the leak is by walking from the meter towards the house valve looking for water/wet ground, estimating where the houseline is going, then proceed with the piped meter box installation by going to **step H.7**.

   iii. If you determine that there is a leak in the customer's house line or in the house itself, leave a note to the customer to that effect on a door hanger before leaving the job site.

NOTE: If any additional work needs to be done other than a piped meter box installation, a new work order must be created.

7. Record the existing meter readings. (see Figure 9)

NOTE: If the meter glass is fogged, break and remove the glass with the appropriate tools and PPE.

Figure 9. Existing meter reading

NOTE: Always remember meter configuration involving domestic and irrigation lines. (refer to Figures 6f and 6g)

8. Excavate in and around the existing meter box and remove the box. Make sure to excavate at least 6” to 8” below the house and irrigation line to leave enough room to work with. (see Figure 10)

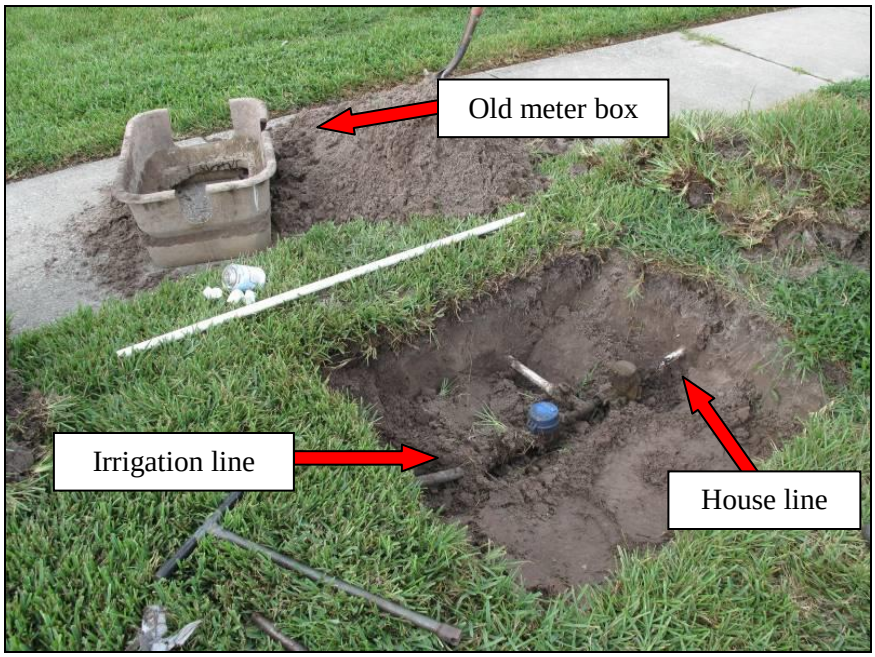


Figure 10. Excavating meter box – Domestic and Irrigation lines

9. Turn off the water service by closing the curb stops using the curb stop key. Turn clockwise ¼ to close both curb stops. (see Figures 11 and 12)

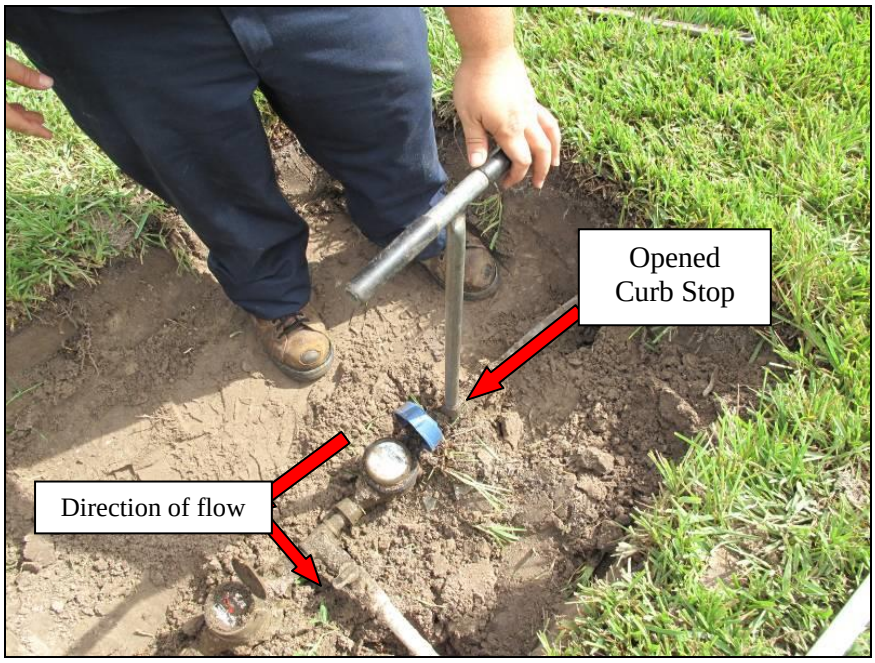


Figure 11. Opened Curb Stop

Figure 12. Closed Curb Stop

10. Close off any other curb stops. (see Figure 13)

Figure 13. Closing additional curb stops

11. Remove both meters and always take notice of their configurations. Loosen meter couplings using meter wrenches or simply cut the PVC lines and loosen the meter coupling by the first curb stop and remove the entire section. (see Figures 14-17)

Figure 14. Cutting the house line

Figure 15. Cutting the irrigation line

NOTE: If necessary, when using wrench to loosen coupling make sure to hold the meter for leverage.

Figure 16. Loosening Meter coupling

Figure 17. Meters Removed

12. Plug the house line to prevent any dirt or debris from entering the line.
13. Use a crimper to crimp the service line ahead of the curb stop. (see Figure 18)

Figure 18. Service line crimped

14. Use the poly cutter to cut the service line on the downstream side of the crimper. (see Figure 19)

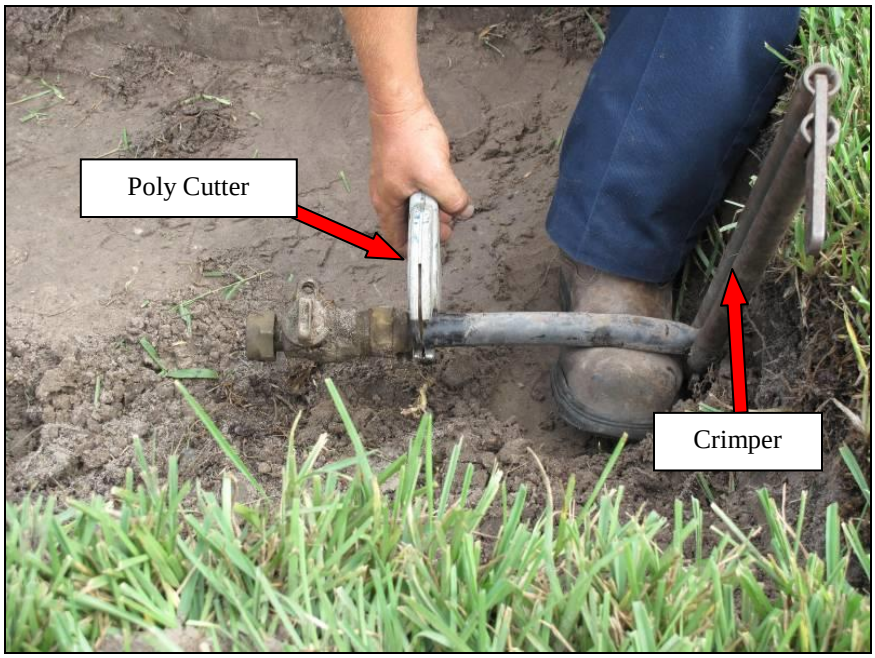


Figure 19. Cutting the service line with poly cutter

NOTE: Use a hand pump to remove any water that might have flowed into the excavation.

NOTE: Because the crimp is a potential weak point in the service line, a compression coupling will be placed over the crimped area. The coupling adds strength to the crimped line, preventing deterioration and leaks at that point.

15. Quickly place a compression by compression coupling over the crimped off area followed by a compression by compression curb stop.
16. Installing a compression by compression curb stop:
    a. Place a compression by compression curb stop in the open position. (see Figure 20)
    b. Tighten the bolts on only the curb stop using a nut driver or flat head screw driver.

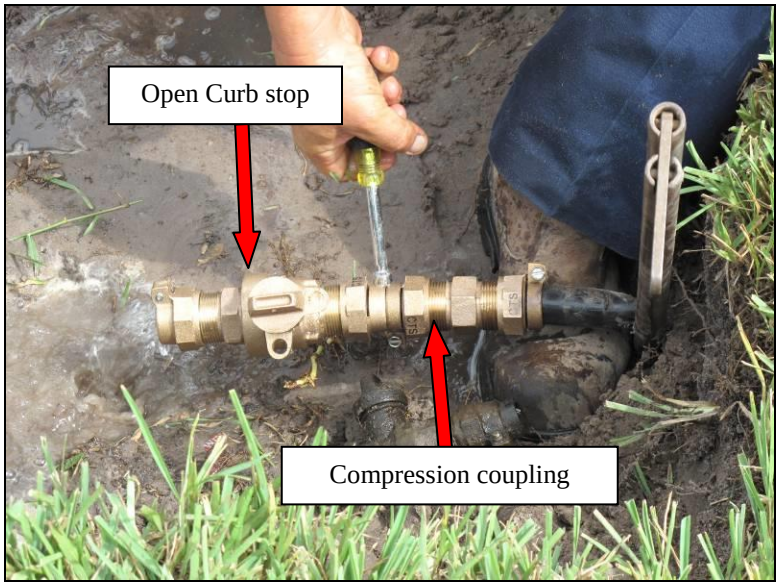


Figure 20. Curb stop and compression coupling

    c. Close the curb stop once installed. (See Figure 21)

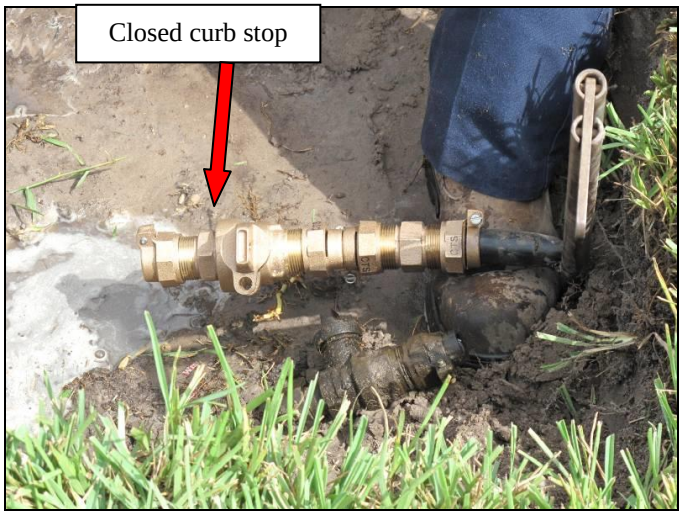


Figure 21. Closed curb stop

d. Using two meter wrenches tighten curb stop securely. (see Figure 22)

Figure 22. Tightening curb stop

e. Remove the crimper and slide compression coupling over crimped area. Tighten coupling using meter wrenches. (see Figure 23)

Figure 23. Tightening compression coupling

f. Tighten bolts to secure the poly line. (see Figure 24)

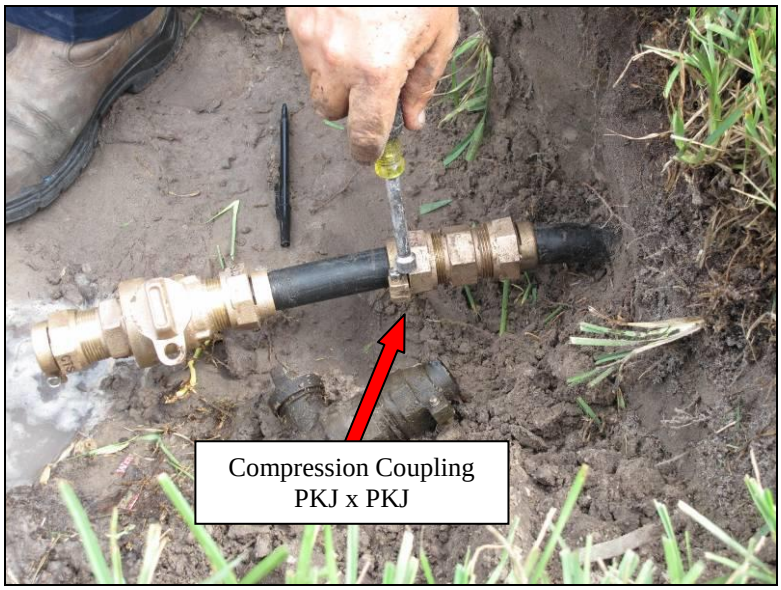


Figure 24. Tightening bolts on the compression coupling

17. Prepare the piped meter box:

    a. Remove spacers from the meter box by loosening the couplings inside box. (see Figures 25 and 26)

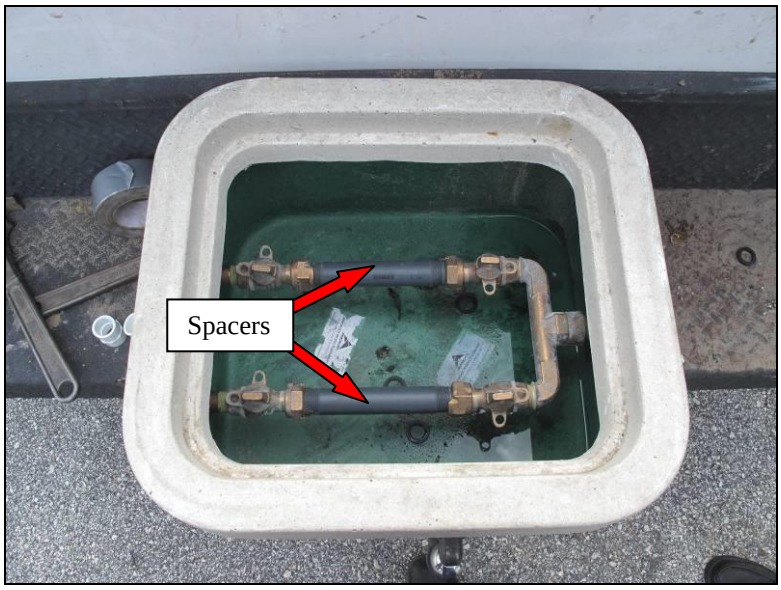


Figure 25. Spacers in meter box

Figure 26. Spacers removed

NOTE: On the newer meter boxes, backflow devices are going to be installed inside the box and the curb stop will be installed outside the box. (see Figure 27 and 28)

Figure 27. Backflow Preventer

Figure 28. Meter Box with Backflow Preventer installed inside/curb stop outside of box

b. Remove end caps and thread protectors from the meters being installed. (see Figures 29 and 30)

Figure 29. Preparing meter to be installed, removing end caps and thread protectors

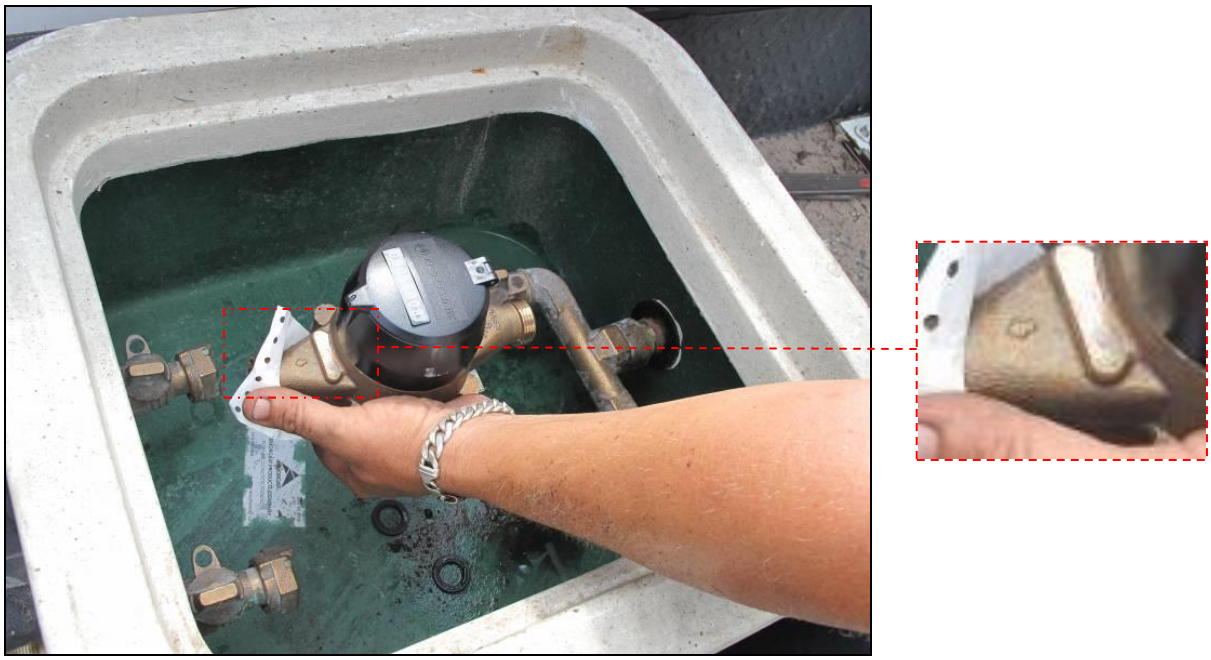


Figure 30. Arrow on meter indicates direction of flow

NOTE: Make sure meters are facing in the direction of flow, which is the opposite of the single inlet side.

c. Install meters into box with two ¾”x⅛” black rubber washers on each side and tighten using a meter wrench. (see Figures 31 and 32)

Figure 31. Tightening meters in new box

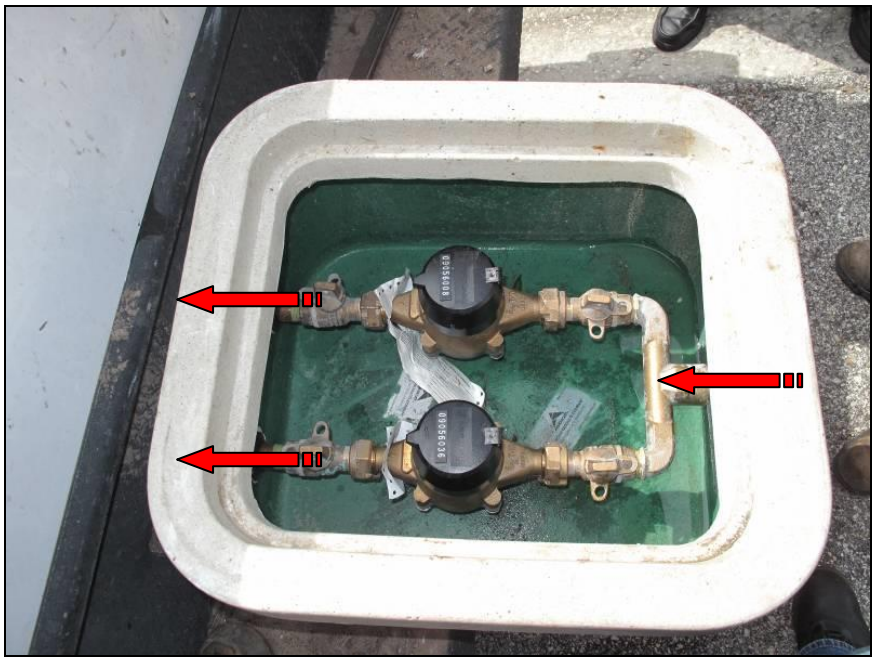


Figure 32. Meters in box and direction of flow

d. Remove all thread protectors from the brass inlet and outlet holes. (see Figures 33 and 34)

Figure 33. Outlet thread protectors

Figure 34. Inlet thread protector

e. Apply joint compound to inlet and outlet threads. (see Figures 35 and 36)

Figure 35. Applying joint compound to inlet thread

Figure 36. Applying joint compound to outlet threads

f. Install a thread by compression elbow to the inlet thread and tighten using two meter wrenches. Always direct elbow in desired direction based on particular configuration. (see Figure 37)

Figure 37. Thread by compression elbow and tightening using two meter wrenches

g. On the outlet side of the box install two female adapters and tighten. (See Figure 38)

Figure 38. Tightening female adapters

18. Install the standpipe on the service line, and flush line. (see Figure 39)

Figure 39. Standpipe Installed in Service Line

i. Turn on curb stop using curb stop key, flush service, approximately for 1 minute (see Figure 40)

Figure 40. Flushing Service

19. Prepare for meter box installation:
    a. Measure and cut enough polyethylene tubing to connect from the curb stop to the proposed meter box location.
    b. Install polyethylene tubing into curb stop and tighten bolts and coupling. (see Figure 41)

Figure 41. Polyethylene tubing installed in curb stop

NOTE: Review standard drawings for proper meter box configuration, including where to place the domestic and irrigation meters as well as placement of box according to property line. The domestic meter labeled "D" must always be placed closest to the property line while the irrigation meter labeled "IR" will be furthest from property line. (see Figure 42)

20. Set piped meter box. Make sure to align with house lines and service line. (see Figure 42)

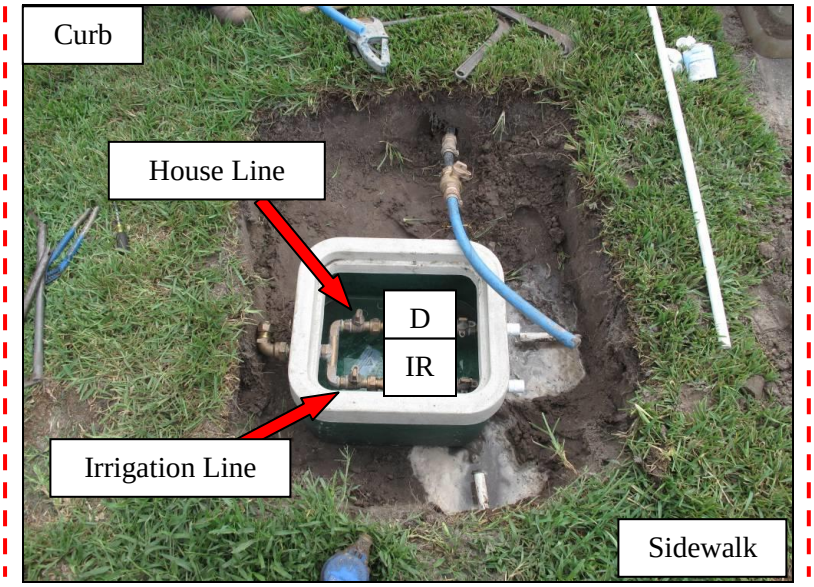


Figure 42. Piped box in place

21. Install the end of polyethylene tubing into the 90º thread by compression elbow and tighten using two meter wrenches. Tighten bolt with flat head screw driver or socket wrench. (see Figure 43)

Figure 43. Poly into 90º thread by compression elbow

22. Close the curb stop and open the service line inside the piped box to check for any leaks. If leaks are detected, use meter wrenches to tighten any fittings. (see Figure 44)

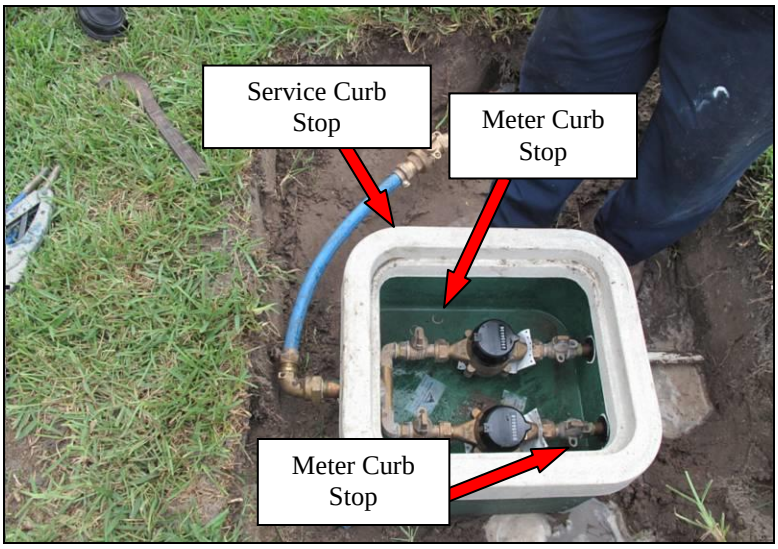


Figure 44. Checking leaks from service line curb stop to meter box curb stops

NOTE: Per standards and specifications, domestic water lines are located closest to the property line while irrigation lines are always furthest from property line.

23. Always mark or label any irrigation meters in piped box. (See Figure 45)

Figure 45. Labeled irrigation meter

NOTE: The following example is one of the various situations that can be encountered in the field. The field specialist must be prepared to make modifications accordingly. Here, the house line is closer to the irrigation meter while the irrigation line is closer to the domestic meter and therefore the lines must be crossed.

24. Remove the plug from the house line.
25. Measure and coordinate PVC piping to connect from the house line and irrigation line to the meter box utilizing 45º or 90º angles to best fit the piping in the required space. Always apply PVC cement to every fitting. (see Figures 46-52 for a sample installation)

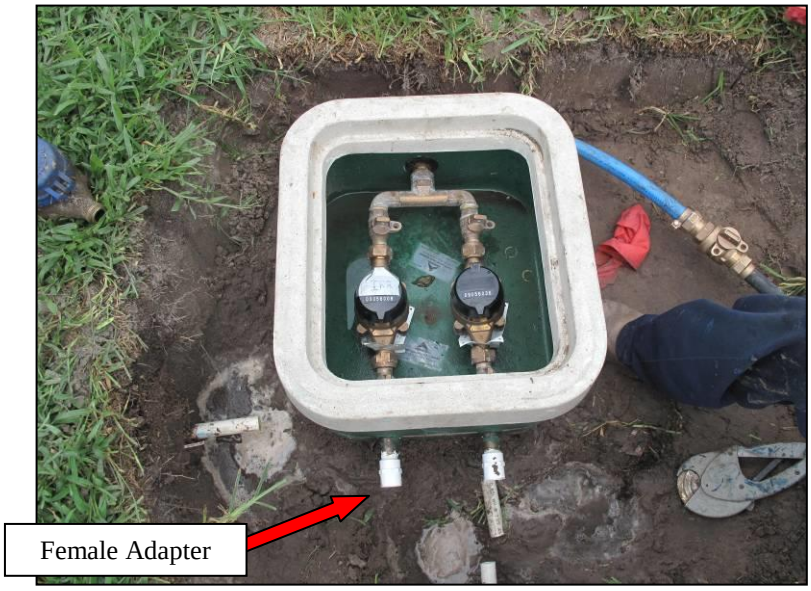


Figure 46. PVC connections

Figure 47. PVC cement

Figure 48. Cutting PVC

Figure 49. Aligning PVC

Figure 50. PVC

Figure 51. Measuring PVC

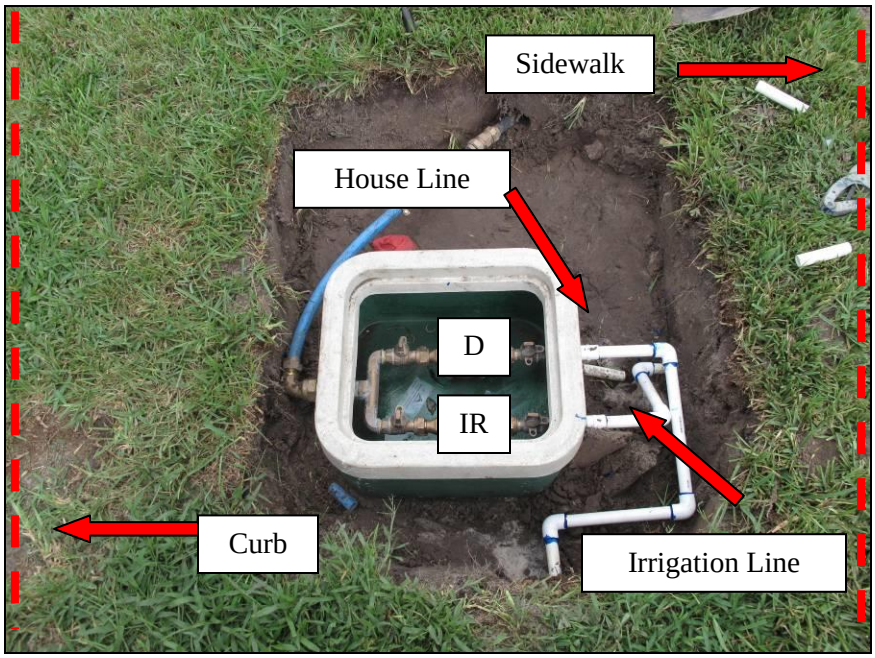


Figure 52. Final PVC configuration

26. Open the nearest hose bib on the exterior of the house.
27. Slowly open curb stops and flush 20 gallons of water. This process will allow you to make sure all meters are working and the lines are free of debris and air.
28. Close the hose bib.
29. Check the house lines, meter boxes, and fittings for any leaks.
30. If leaks found, identify location of leak:
    a. Meters – Replace washers and/or couplings and tighten using meter wrenches. If meter needs to be replaced, a new work order must be generated. (Refer to D-MS-04, Meter leaks and D-MS-05 Meter Replacement 5/8" to 1")
    b. Couplings – Tighten using meter wrenches.
    c. Curb stop – Tighten using meter wrenches. If replacement is needed, a new work order must be generated. (Refer to D-MS-02, Curb Stop Replacement)
    d. Service line –If service line must be repaired, a new work order must be generated.
    e. Reconnect house and irrigation lines as previously described in this procedure using PVC pipes.
31. Notify the customer that the work has been completed and the water is back in service.
32. Fill out the Field Services Division Service Information door hanger and hand to the customer for feedback purposes (See Figures 53a through 53d). The following items should be checked/filled on card:

NOTE: If customer is not home, leave the Field Services Division Service Information "door hanger" on the customer's door after filling/checking out the following information:

    a. Service Call Date

b. Work order number

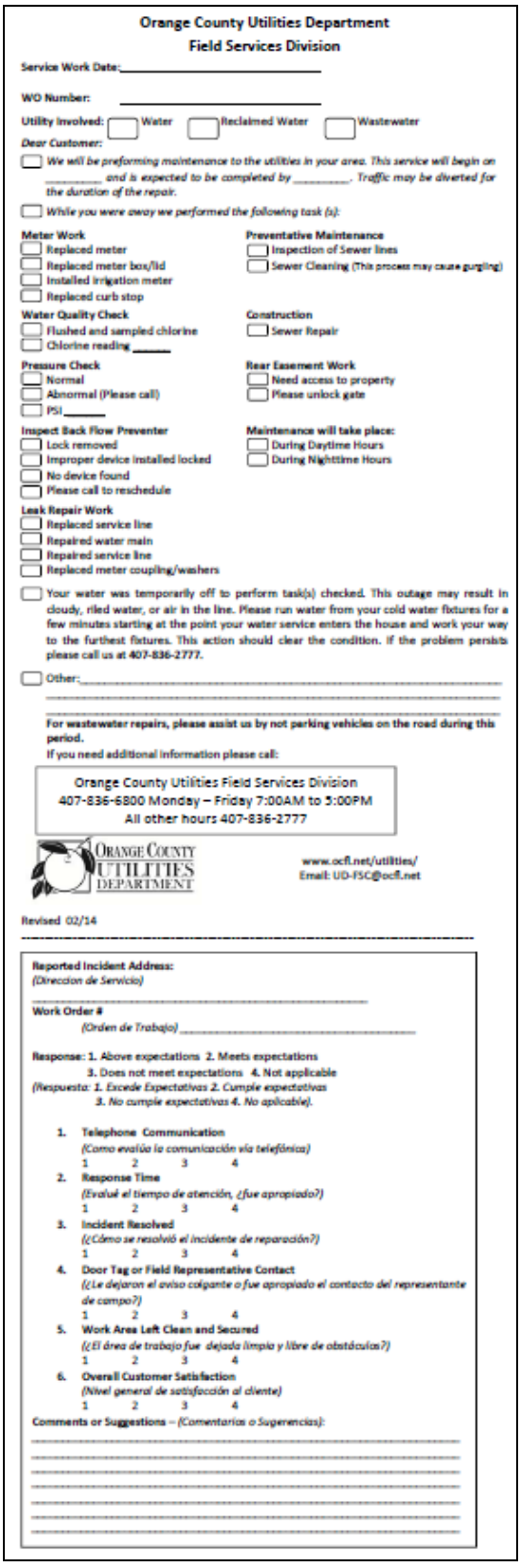
c. Water

d. Replaced Meter, Replaced Meter Box/Lid, Installed Irrigation Meter (if applicable)

e. Please run water through more than one faucet in your residence/business until water runs clear

f. Other - A note to customer instructing him/her to flush water until it is also free of air.

g. Report Incident Address and include the work order number again.



Orange County Utilities Department
Field Services Division

Service Work Date:_____

WO Number: _____

Utility Involved: ☐ Water ☐ Reclaimed Water ☐ Wastewater

Dear Customer:

☐ *We will be preforming maintenance to the utilities in your area. This service will begin on _____ and is expected to be completed by _____. Traffic may be diverted for the duration of the repair.*

☐ *While you were away we performed the following task (s):*

Meter Work
☐ Replaced meter
☐ Replaced meter box/lid
☐ Installed irrigation meter
☐ Replaced curb stop

Preventative Maintenance
☐ Inspection of Sewer lines
☐ Sewer Cleaning (This process may cause gurgling)

Water Quality Check
☐ Flushed and sampled chlorine
☐ Chlorine reading _____

Construction
☐ Sewer Repair

Pressure Check
☐ Normal
☐ Abnormal (Please call)
☐ PSI _____

Rear Easement Work
☐ Need access to property
☐ Please unlock gate

Inspect Back Flow Preventer
☐ Lock removed
☐ Improper device installed locked
☐ No device found
☐ Please call to reschedule

Maintenance will take place:
☐ During Daytime Hours
☐ During Nighttime Hours

Leak Repair Work
☐ Replaced service line
☐ Repaired water main
☐ Repaired service line
☐ Replaced meter coupling/washers

☐ Your water was temporarily off to perform task(s) checked. This outage may result in cloudy, riled water, or air in the line. Please run water from your cold water fixtures for a few minutes starting at the point your water service enters the house and work your way to the furthest fixtures. This action should clear the condition. If the problem persists please call us at **407-836-2777.**

☐ Other:_____

For wastewater repairs, please assist us by not parking vehicles on the road during this period.

If you need additional information please call:

Orange County Utilities Field Services Division
407-836-6800 Monday – Friday 7:00AM to 5:00PM
All other hours 407-836-2777

ORANGE COUNTY UTILITIES DEPARTMENT

www.ocfl.net/utilities/
Email: UD-FSC@ocfl.net

Revised 02/14

Reported Incident Address:
(Direccion de Servicio)
_____

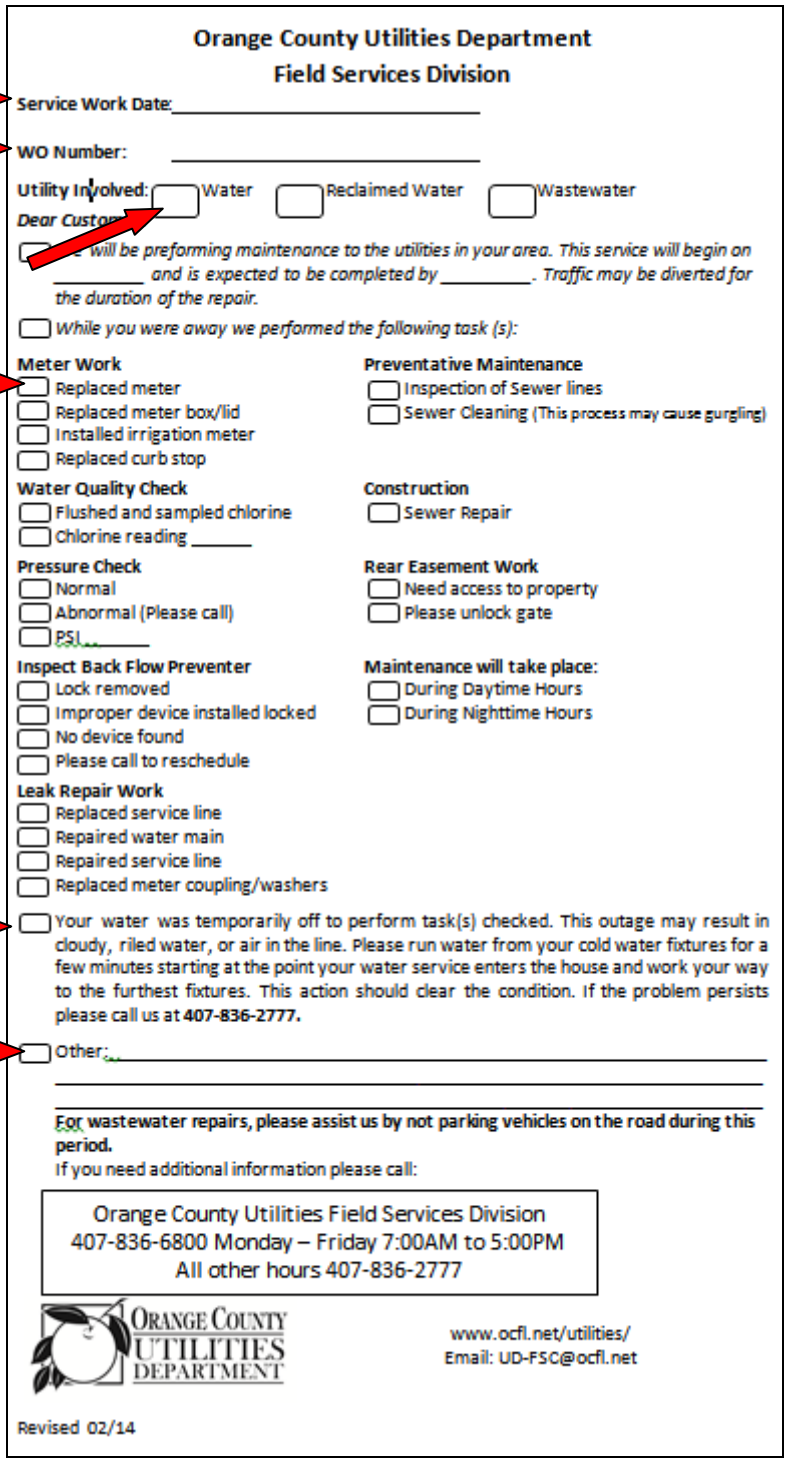
Work Order #
(Orden de Trabajo) _____

Response: 1. Above expectations **2.** Meets expectations
3. Does not meet expectations **4.** Not applicable
*(Respuesta: **1.** Excede Expectativas **2.** Cumple expectativas*
***3.** No cumple expectativas **4.** No aplicable).*

1. **Telephone Communication**
   (Como evalúa la comunicación vía telefónica)
   1 2 3 4
2. **Response Time**
   (Evaluó el tiempo de atención, ¿fue apropiado?)
   1 2 3 4
3. **Incident Resolved**
   (¿Cómo se resolvió el incidente de reparación?)
   1 2 3 4
4. **Door Tag or Field Representative Contact**
   (¿Le dejaron el aviso colgante o fue apropiado el contacto del representante de campo?)
   1 2 3 4
5. **Work Area Left Clean and Secured**
   (¿El área de trabajo fue dejada limpia y libre de obstáculos?)
   1 2 3 4
6. **Overall Customer Satisfaction**
   (Nivel general de satisfacción al cliente)
   1 2 3 4

Comments or Suggestions – *(Comentarios o Sugerencias):*
_____
_____
_____
_____
_____
_____
_____

Figure 53a. Field Services Division Service Information complete form



Orange County Utilities Department
Field Services Division

Service Work Date: _____

WO Number: _____

Utility Involved: ☐ Water ☐ Reclaimed Water ☐ Wastewater

Dear Custo

☐ *… will be preforming maintenance to the utilities in your area. This service will begin on _____ and is expected to be completed by _____. Traffic may be diverted for the duration of the repair.*

☐ *While you were away we performed the following task (s):*

Meter Work
- ☐ Replaced meter
- ☐ Replaced meter box/lid
- ☐ Installed irrigation meter
- ☐ Replaced curb stop

Preventative Maintenance
- ☐ Inspection of Sewer lines
- ☐ Sewer Cleaning (This process may cause gurgling)

Water Quality Check
- ☐ Flushed and sampled chlorine
- ☐ Chlorine reading _____

Construction
- ☐ Sewer Repair

Pressure Check
- ☐ Normal
- ☐ Abnormal (Please call)
- ☐ PSI _____

Rear Easement Work
- ☐ Need access to property
- ☐ Please unlock gate

Inspect Back Flow Preventer
- ☐ Lock removed
- ☐ Improper device installed locked
- ☐ No device found
- ☐ Please call to reschedule

Maintenance will take place:
- ☐ During Daytime Hours
- ☐ During Nighttime Hours

Leak Repair Work
- ☐ Replaced service line
- ☐ Repaired water main
- ☐ Repaired service line
- ☐ Replaced meter coupling/washers

☐ Your water was temporarily off to perform task(s) checked. This outage may result in cloudy, riled water, or air in the line. Please run water from your cold water fixtures for a few minutes starting at the point your water service enters the house and work your way to the furthest fixtures. This action should clear the condition. If the problem persists please call us at **407-836-2777.**

☐ Other: _____

_____

_____

For wastewater repairs, please assist us by not parking vehicles on the road during this period.

If you need additional information please call:

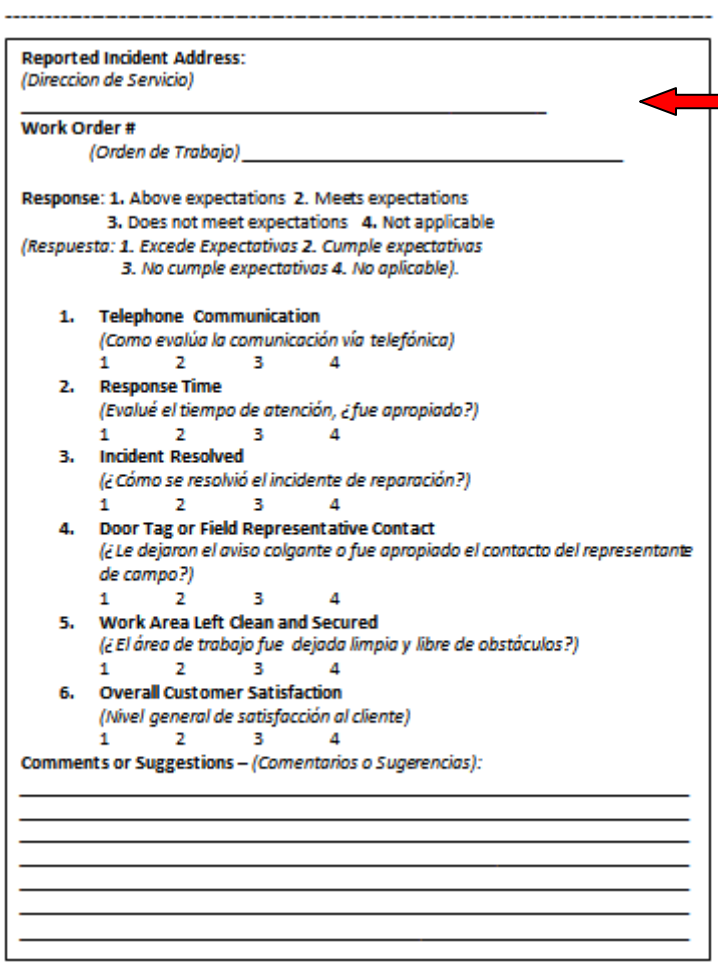
Orange County Utilities Field Services Division
407-836-6800 Monday – Friday 7:00AM to 5:00PM
All other hours 407-836-2777

ORANGE COUNTY UTILITIES DEPARTMENT

www.ocfl.net/utilities/
Email: UD-FSC@ocfl.net

Revised 02/14

Figure 53b. Field Services Division Service Information top section



Reported Incident Address:
(Direccion de Servicio)

_____

Work Order #
(Orden de Trabajo) _____

Response: **1.** Above expectations **2.** Meets expectations
3. Does not meet expectations **4.** Not applicable
*(Respuesta: **1.** Excede Expectativas **2.** Cumple expectativas*
*3. No cumple expectativas **4.** No aplicable).*

1. **Telephone Communication**
   (Como evalúa la comunicación vía telefónica)
   1 2 3 4
2. **Response Time**
   (Evalué el tiempo de atención, ¿fue apropiado?)
   1 2 3 4
3. **Incident Resolved**
   (¿Cómo se resolvió el incidente de reparación?)
   1 2 3 4
4. **Door Tag or Field Representative Contact**
   (¿Le dejaron el aviso colgante o fue apropiado el contacto del representante de campo?)
   1 2 3 4
5. **Work Area Left Clean and Secured**
   (¿El área de trabajo fue dejada limpia y libre de obstáculos?)
   1 2 3 4
6. **Overall Customer Satisfaction**
   (Nivel general de satisfacción al cliente)
   1 2 3 4

Comments or Suggestions – *(Comentarios o Sugerencias):*

_____
_____
_____
_____
_____
_____
_____

Fill in customer's address and in addition the work order number. **NOTE:** This is the return part (feedback) of the Door Hanger.

Figure 53c. Field Services Division Service Information bottom section front

NO POSTAGE
NECESSARY IF
MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL
FIRST CLASS MAIL PERMIT No. 4557 ORLANDO FL

POSTAGE WILL BE PAID BY ADDRESSEE

ORANGE COUNTY UTILITIES
FIELD SERVICES DIVISION
8100 PRESIDENTS DRIVE
ORLANDO, FL 32809-7679

Figure 53d. Field Services Division Service Information bottom section back

CAUTION: When backfilling make sure to compact and not leave any voids or pockets under any PVC fittings or lines. (See Figure 54)

Figure 54. Backfilling and compacting

33. Backfill area around meter box. Replace sod if removed and compact the surface. Try to leave in original conditions.
    a. If achieving original conditions is not possible, fill a restoration request form and hand to Senior Utilities Maintenance Coordinator (SUMC). (See Form 2)
    b. Figure 55 illustrates an example of a job not requiring a Restoration Request Form. Figure 56 illustrates an example requiring a Restoration Request form.

Figure 55. Completed job requiring NO restoration request form

Figure 56. Completed job requiring a restoration request form

34. Fill the Field Activity Reporting screen:

    i. Fill in the old meter reading in the first Register 1 Reading box

    ii. Find the new meter serial number in Enter New Meter box and fill in the new meter reading directly under it, in the second Register 1 Reading box.

    iii. Click “Finish” in the bottom right hand corner of the screen when complete (see figure).

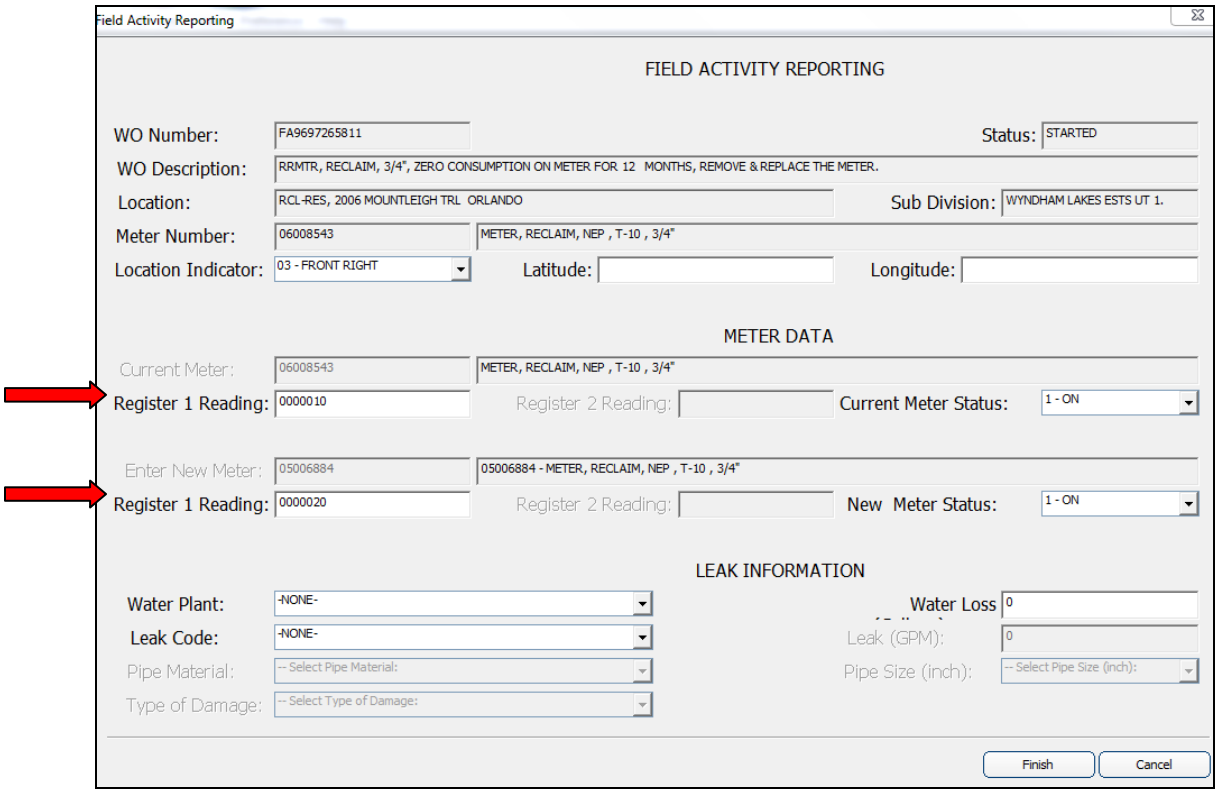


Figure 57. Field Activity Reporting

b. Fill out the completion info including: (see Figure 58)

i. Failure as “SERVICE POINT”

ii. Problem as “MTRBOX-METER BOX”

iii. Cause as “CIS-CUSTOMER INFORMATION SYSTEM”

iv. Remedy as “ RPMTRBX – REPLACE METER BOX”

v. In the Note field, include a description of the work done.

c. Click “Next” and this will take you to the main screen; the Maximo portion for this procedure is now complete.

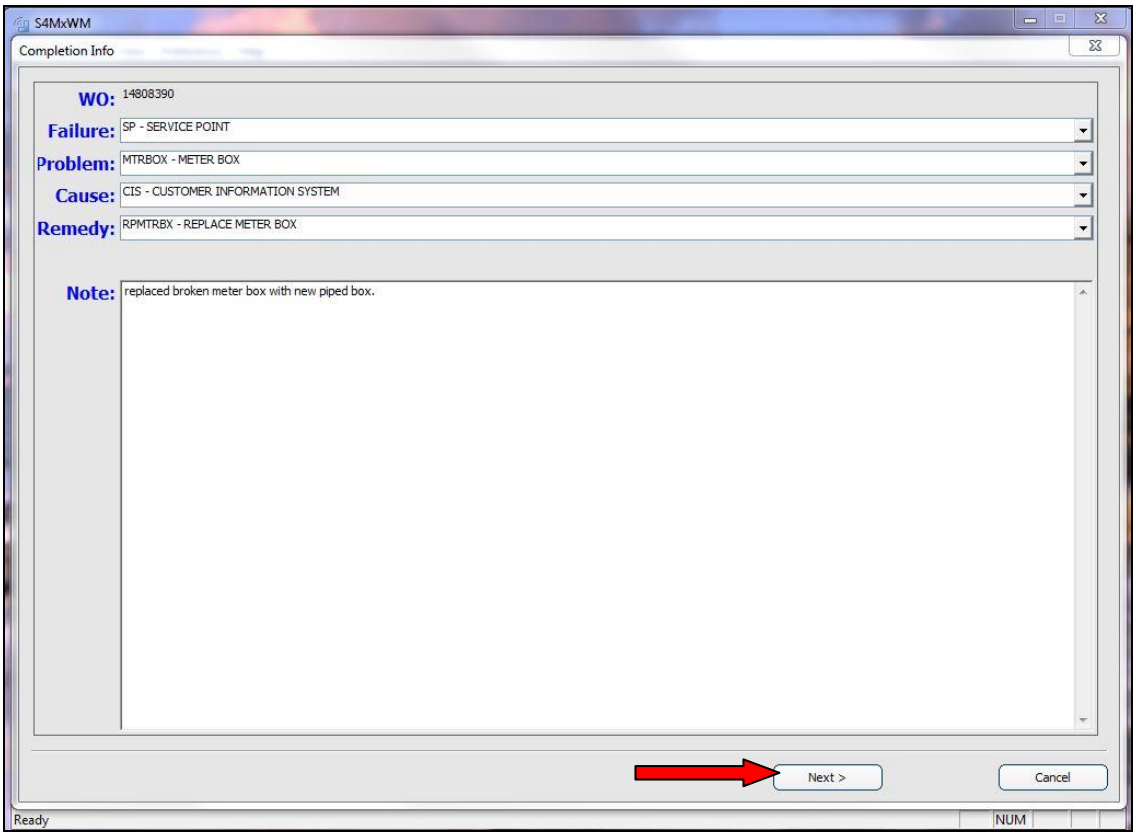


Figure 58. Completion info

d. Entries on the Work Order Screen may be Added, Edited, or Copied by selecting the tabs on the right-hand side of the screen (see Figure 59)

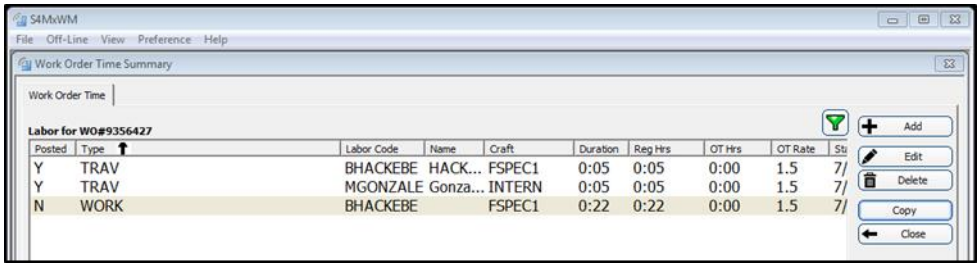


Figure 59. Add, Edit, or Copy the entry

REVISION LOG:

Revision Date	Section	Description	Author's Initials	Section Manager or Division Manager Approval
6/21/2011	H.5	Removed pliers or wrench as alternate tools to be used to remove meter lid.	N/A	N/A
	ALL	Re-numbered entire SOP		
	Attachment 1	Added attachment 1, "S.O.P Checklist / Job Plan"		
2/13/2013	All Pictures	Formatted pictures to an appropriate size	N/A	N/A
	ALL	Brought document to current formatting and style standards		
	ALL	Renumbered entire SOP and accompanying figures.		
	Header	Updated SOP header to Field Services Division		
	B.3.	Removed referenced "D-CT-02" and "DC-CT-03" SOPs. They do not exist.		
	E.1.c	Added line plug to equipment list.		
	E.2.c	Added Hydrosert fittings to materials list.		
	G.2.c	Added procedure for the use of meter jumper cables if required.		
	H.6	Removed step (redundancy) and re-numbered steps.		
	H.7	Removed non-existing references.		
	H.9	Added sentence about appropriate excavation clearance.		
	H.16	Reworded step.		
	H.17	Added procedure for using compression by compression curb stop.		

	H.18	Added procedure for using Hydrosert fittings.		
	H.19.c	Added size of washers: ¾”x⅛”	N/A	N/A
	H.25	Added NOTE above step.		
	H.31.a	Reworded step.		
	H.31.a,c &d	Added “New work order must be generated”.		
	H.34	Added step for filling out Water Service Information card.		
	H.38-41	Removed steps for the installation of two boxes.		
	Form 1	Added Water Service Information form		
	Form 2	Updated Restoration Form		
7/9/2019	Attachment 1	Updated Attachment 1 to reflect changes.	CJ	JRS
	H	Added Figures 18-20, 27-28, 30-31, 39-40		
	H.17	Note for backflow device added.		
	H.18	Standpipe procedure added. Reorganized order of procedures due to addition.		

Prepared By:	**SME:**	**Section Manager Approval & Date:**
Clifford Alejos	Ed Puskarie	Digitally signed by Robert J. Dudas DN: cn=Robert J. Dudas, c=US, o=Distribution Section, ou=Water Divison, email=bob.dudas@ocfl.net Date: 2010.01.28 16:51:38 -05'00'

Attachment 1
Request for Restoration Form

ORANGE COUNTY GOVERNMENT FLORIDA

Y18-1046

Utilities Department, Field Services Division
8100 Presidents Drive, Suite A
Orlando, Florida 32809
407-836-6818 Facsimile: 407-836-6849

Request for Quotation

Rev. 1.4

Vendor: Stage Door II Inc. , 3208 Overland Rd Apopka, FL 32703 Tel: 407-578-2918 Fax: 407-578-2921

Date: _____ Repair Work Order #: _____

Requested by & Phone: _____ Restoration Work Order #: _____

Supervisor & Phone: _____ Do Barricades/MOT need to remain on site for restoration? Yes ☐ No ☐

How many barricades and type of safety device need to be left on site?

Job Address & Subdivision: _____

Territory: East ☐ West ☐ South ☐ Gate Code & Special Access Info: _____

Cause of Damages: _____

Circle all that apply: (Pavement Marking could be affected after final cutbacks)

Concrete:	Sidewalk ☐	Curb ☐	Driveway ☐	ADA ☐	Other:
Road Base:	Concrete ☐	Limerock ☐			Other:
Road Surface:	Milling ☐	Asphalt ☐	Pavement Markings ☐		Other:
Ground Work:	Floratam ☐	Bahia ☐	Seeding ☐	Zoysia ☐	Other:
Pump Station:	Driveway w/ fiber ☐	Geofabric ☐	57 Stone ☐	6x16 w/ reveal ☐	Other:

Provide sketch and indicate north arrow in circle below. Use back of this sheet and/or additional sheets as needed.

Drawing must be DETAILED and include ALL lengths, widths, thicknesses, and any other dimension(s) as applicable

Avg. Asphalt thickness _____(based on min. 4 measurements)

Total Cost: $_____

Estimate Approved: _____ **(sign and date)**

Payment Approved: _____ **(sign and date)**

Z:\Restoration Sheet Y18-1046 Rev 1.4

Attachment 2
Door Hanger

Orange County Utilities Department
Field Services Division

Service Work Date:_____

WO Number: _____

Utility Involved: ☐ Water ☐ Reclaimed Water ☐ Wastewater

Dear Customer:

☐ *We will be preforming maintenance to the utilities in your area. This service will begin on _____ and is expected to be completed by _____. Traffic may be diverted for the duration of the repair.*

☐ *While you were away we performed the following task (s):*

Meter Work
- ☐ Replaced meter
- ☐ Replaced meter box/lid
- ☐ Installed irrigation meter
- ☐ Replaced curb stop

Preventative Maintenance
- ☐ Inspection of Sewer lines
- ☐ Sewer Cleaning (This process may cause gurgling)

Water Quality Check
- ☐ Flushed and sampled chlorine
- ☐ Chlorine reading _____

Construction
- ☐ Sewer Repair

Pressure Check
- ☐ Normal
- ☐ Abnormal (Please call)
- ☐ PSI_____

Rear Easement Work
- ☐ Need access to property
- ☐ Please unlock gate

Inspect Back Flow Preventer
- ☐ Lock removed
- ☐ Improper device installed locked
- ☐ No device found
- ☐ Please call to reschedule

Maintenance will take place:
- ☐ During Daytime Hours
- ☐ During Nighttime Hours

Leak Repair Work
- ☐ Replaced service line
- ☐ Repaired water main
- ☐ Repaired service line
- ☐ Replaced meter coupling/washers

☐ Your water was temporarily off to perform task(s) checked. This outage may result in cloudy, rlled water, or air in the line. Please run water from your cold water fixtures for a few minutes starting at the point your water service enters the house and work your way to the furthest fixtures. This action should clear the condition. If the problem persists please call us at **407-836-2777.**

☐ Other:_____
_____
_____

For wastewater repairs, please assist us by not parking vehicles on the road during this period.

If you need additional information please call:

Orange County Utilities Field Services Division
407-836-6800 Monday – Friday 7:00AM to 5:00PM
All other hours 407-836-2777

ORANGE COUNTY UTILITIES DEPARTMENT

www.ocfl.net/utilities/
Email: UD-FSC@ocfl.net

Revised 02/14

Reported Incident Address:
(Direccion de Servicio)
_____

Work Order #
(Orden de Trabajo) _____

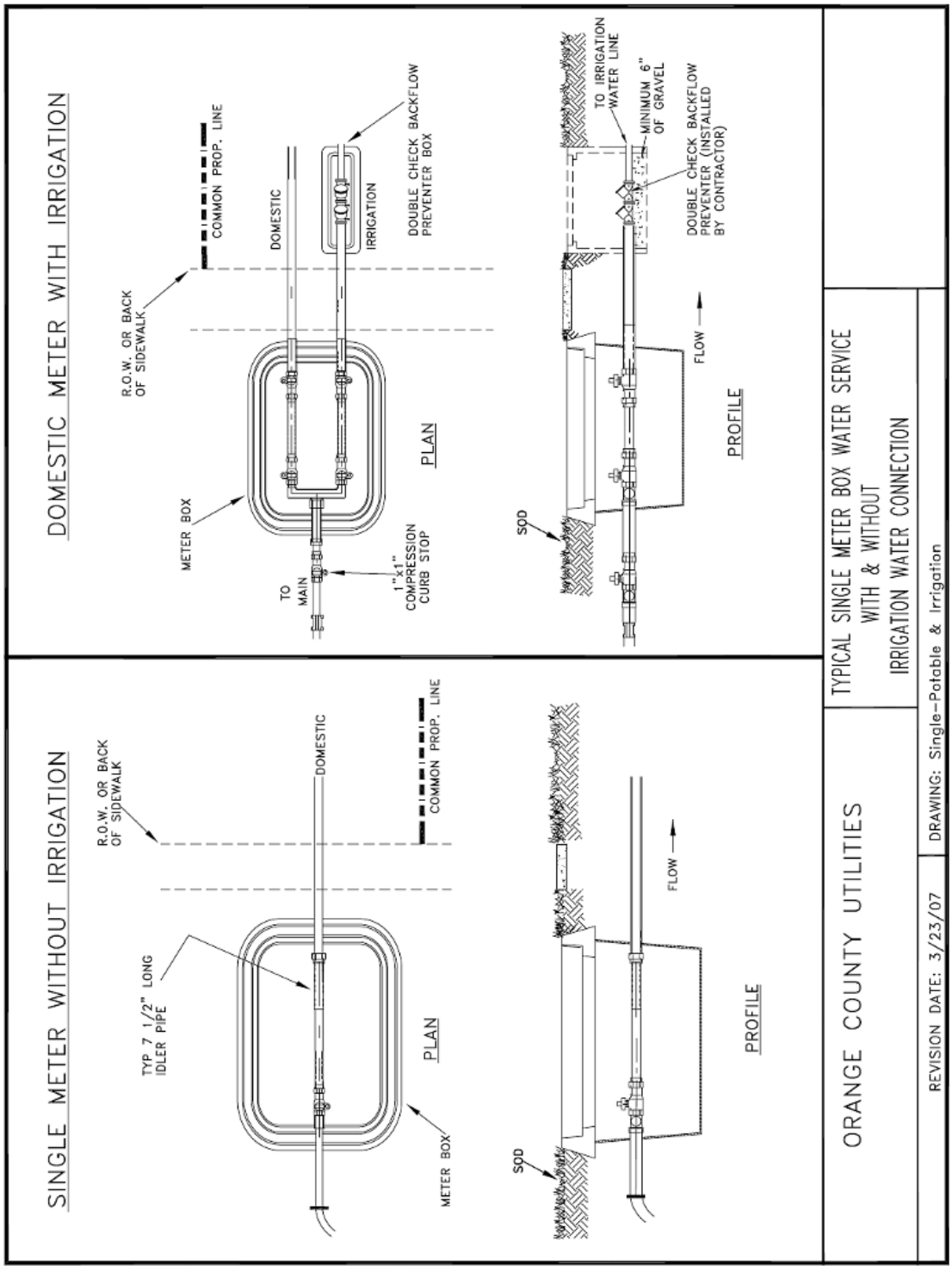
Response: 1. Above expectations 2. Meets expectations 3. Does not meet expectations 4. Not applicable
(Respuesta: 1. Excede Expectativas 2. Cumple expectativas 3. No cumple expectativas 4. No aplicable).

1. **Telephone Communication**
   (Como evalúa la comunicación vía telefónica)
   1 2 3 4
2. **Response Time**
   (Evaluó el tiempo de atención, ¿fue apropiado?)
   1 2 3 4
3. **Incident Resolved**
   (¿Cómo se resolvió el incidente de reparación?)
   1 2 3 4
4. **Door Tag or Field Representative Contact**
   (¿Le dejaron el aviso colgante o fue apropiado el contacto del representante de campo?)
   1 2 3 4
5. **Work Area Left Clean and Secured**
   (¿El área de trabajo fue dejada limpia y libre de obstáculos?)
   1 2 3 4
6. **Overall Customer Satisfaction**
   (Nivel general de satisfacción al cliente)
   1 2 3 4

Comments or Suggestions – *(Comentarios o Sugerencias):*
_____
_____
_____
_____
_____
_____
_____

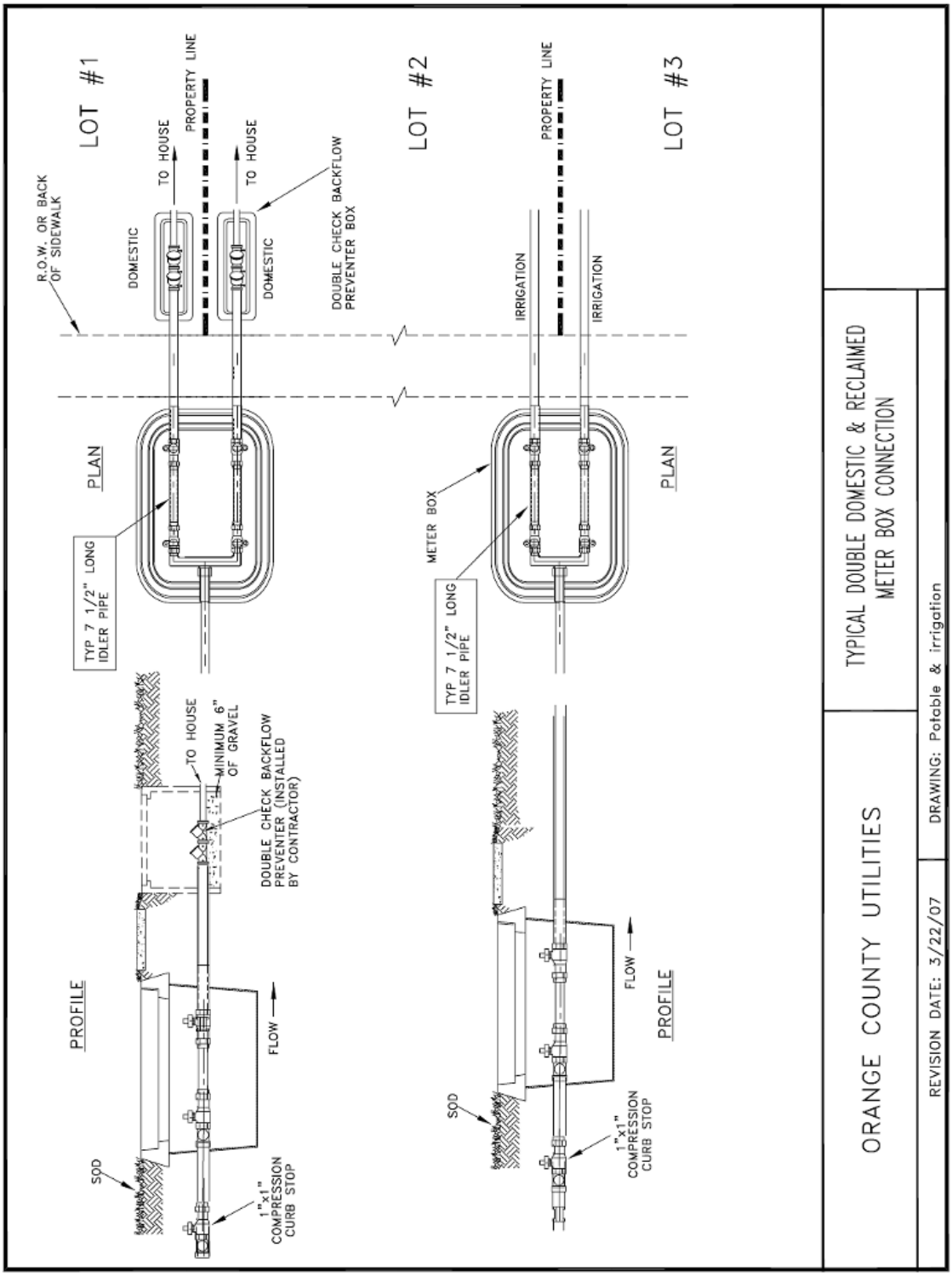
Attachment 3

Double Service Connection On Right Of Way

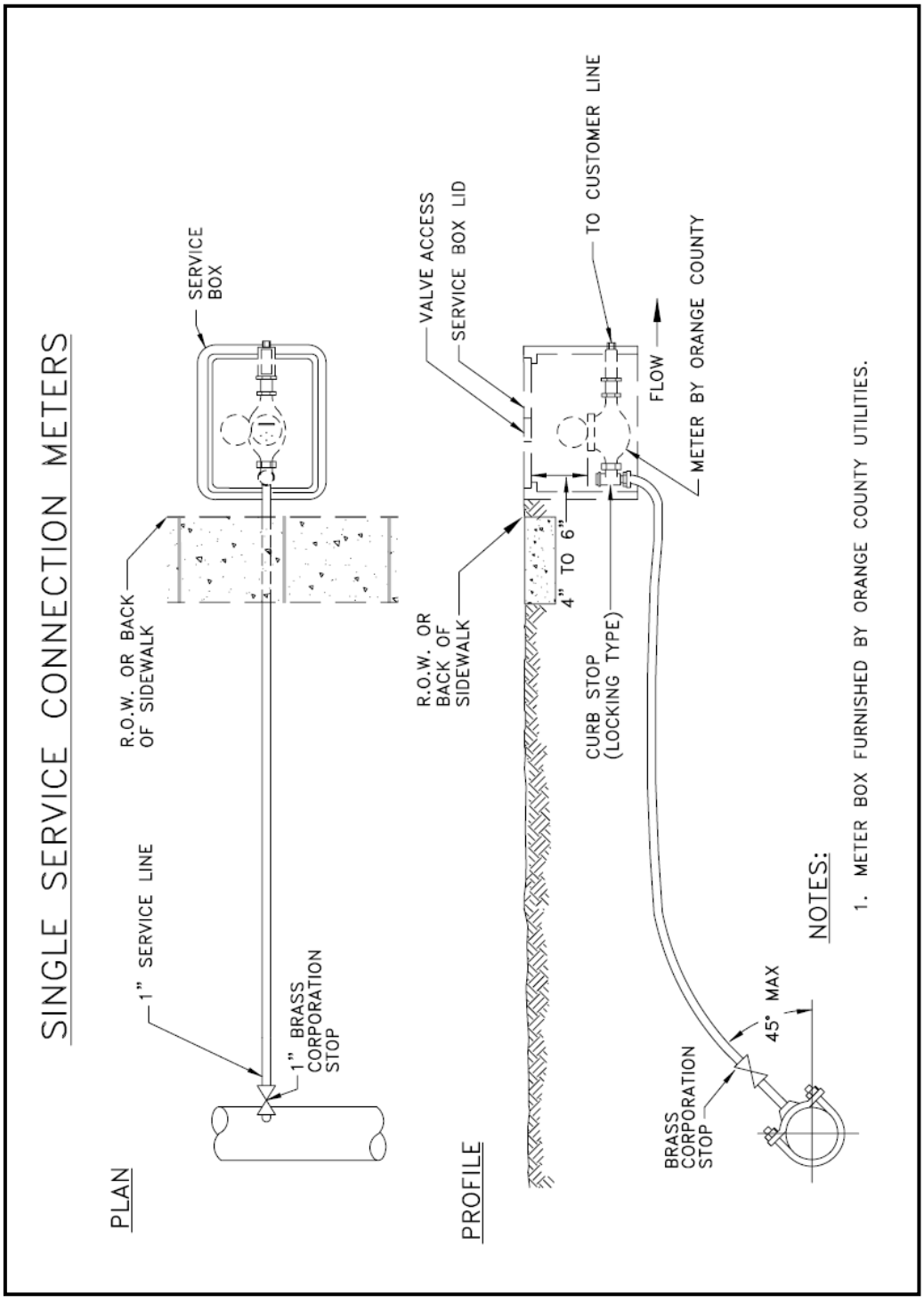


Attachment 4

Double Domestic And Reclaimed Connection On Right Of Way



Attachment 5
Single Service Connection Meters


SINGLE SERVICE CONNECTION METERS
PLAN
1" SERVICE LINE
1" BRASS CORPORATION STOP
R.O.W. OR BACK OF SIDEWALK
SERVICE BOX
PROFILE
R.O.W. OR BACK OF SIDEWALK
VALVE ACCESS
SERVICE BOX LID
4" TO 6"
CURB STOP (LOCKING TYPE)
TO CUSTOMER LINE
FLOW
METER BY ORANGE COUNTY
BRASS CORPORATION STOP
45° MAX
NOTES:
1. METER BOX FURNISHED BY ORANGE COUNTY UTILITIES.

	ORANGE COUNTY UTILITIES **FIELD SERVICES DIVISION** **Standard Operating Procedure**	
Procedure: **Piped Meter Box Installation (5/8" to 1") with New Service**		**Number:** **D-MS-07**
Effective Date: **28 March 2003**	**Revision Date:** **9 July 2019**	

A. PURPOSE:

The primary function of a meter is to measure and display the amount of water passing through a service point. A metered water system is one in which meters are used at all strategic points of a distribution system; from the time water leaves the plant until it reaches all service points. Metering provides many benefits. Meters are the cash registers of the utility. The customer can be billed for the exact amount of water used. The amount of water produced can be determined. Losses of water can be detected by comparing service use meter readings with production meter readings. Since customer usage charges are billed by the volume of water measured by the meter, metering deters excessive use of water and thereby helps control water consumption.

This procedure provides specific guidelines to properly install new meters, 5/8” to 1”, using a piped meter box for a new account. The primary function of a piped meter box is to encase one or two water meters. The full enclosed piped meter box is connected directly to the existing service line. It is installed in the ground with its lid to grade, and in properly compacted soil.

B. REFERENCES:

1. M6 Water Meters – Selection, Installation, Testing, and Maintenance. 4th Edition. Denver: American Water Works Association, 1999.
2. Orange County Utilities Safety and Health Manual
3. Neptune Water Meters Product website < http://www.neptunetg.com/water.cfm?id=432 >
4. Orange County Utilities, Field Services Division Standard Operating Procedures (SOPs):
   a. D-MS-02 Curb Stop Replacement
   b. FS-CT-01 GIS – Locating Addresses and Assets
   c. FS-CT-05 Syclo Data Entry
   d. D-MS-04 Meter Leaks
   e. D-MS-06 Piped Meter Box Installation with Existing Service
5. Sensus Water Meters Product website < http://www.sensus.com/>
6. Water Distribution Systems Operation and Maintenance. 7th edition. Sacramento: CSU, 2018.

C. SKILL AREA:

This section refers to the skills required for the Orange County Utilities (OCU) Skills Testing. The objective is that during training of a specialist the SOPs specific to a skill area can be used in preparation for learning of a skill and the test.

1. Meters & Services

D. PERSONNEL:

1. Trained Field Specialist or above

E. EQUIPMENT:

1. Equipment
    a. Personal Protective Equipment (PPE)
        i. Protective eyewear
        ii. Steel toe shoes
        iii. Safety gloves
        iv. Reflective vests
    b. Hand pump
2. Materials
    a. Meters 5/8" to 1"
    b. Meter couplings
    c. Lock
    d. Curb stops
    e. Piped meter box
    f. Rubber washers
    g. Orange ribbon
    h. Polyethylene tubing
    i. PVC 45º angles
    j. PVC 90º angles
    k. PVC Adapter
    l. PVC cement
    m. PVC pipe
    n. Joint compound/Teflon tape
    o. Safety cones
    p. Wood Stakes
3. Tools
    a. Adjustable wrench
    b. Hammer
    c. Meter wrenches
    d. PVC cutter
    e. Pliers
    f. Pipe bar
    g. Crimper
    h. Curb stop key
    i. Shovel
    j. Hand shovel
    k. Nut driver

F. FORMS:

1. Maximo work order.

G. SAFETY:

1. General Safety:
    a. Employees must be thoroughly familiar with Personal Protection Equipment (PPE), and Orange County Utilities safety policies, as outlined in the "Orange County Utilities Health and Safety Plan," sections:
        i. V - Personal Protective Equipment
        ii. VI - Material Handling
        iii. X - Fleet Safety
        iv. XI - Physical Hazards
    b. All OCU personnel shall wear appropriate (PPE) including but not limited to:
        i. protective eye wear
        ii. steel toe shoes
        iii. safety gloves
2. Operational Safety:
    a. All Orange County Utilities personnel should be careful and aware of the following potential hazards:
        i. Traffic
        ii. Construction debris
        iii. Animals (i.e. snakes, insects, rodents).
        iv. Landscaping
        v. Other utility lines (gas, electrical, etc.)
        vi. Tripping/falling
    b. To some degree all Orange County Utilities employees are involved in manual handling and lifting of materials. The types of injuries that can potentially result from these activities are varied, and include back injuries, hernias, muscle strains, and sprains, ligament damage, broken bones, bruises, and pinches. There injuries can be minimized by practicing proper handling, digging, lifting techniques, and by using equipment properly (i.e. shovels, pry bars and tools).
    c. Vehicle parking while performing assigned task needs to address your own personal safety and the safety of the public. Your vehicle needs to be parked with the flow of traffic; safety flashers need to be on; safety cones need to be placed at front and rear of vehicle as a minimum protection; and Wet Road signs as required.

H. PROCEDURE:

NOTE: If the meter/meter box cannot be installed due to some fault of the builder, Orange County Utilities will charge the builder a trip charge. To insure the trip charge is properly assessed, refer to paragraph H.8.c.iv and Figure 27.

1. Review Maximo work order and locate the lot (see SOP # FS-CT-01 GIS - Locating Addresses and Assets).
   a. Use the inspection board on site to verify you are at the correct lot. Confirm lot number utilizing information on permit board and Maximo work order.
   b. If permit board is missing, not on site, or you cannot determine the correct location, do not proceed with the meter installation. Document the situation on the work order and the scheduler will contact the builder. If builder is on site, make contact and advise him/her of the problem.
2. Park your vehicle so as to protect your personal safety and of the public. Place your vehicle with the flow of traffic; safety flashers on and safety cones at the front and rear of vehicle as a minimum. Place "Wet Road" signs as required (see figure 1).

Figure 1. Vehicle Parking

3. Locate the water service for the assigned lot. Use one of the following methods.
    a. Visually check the curbing for 'W' or “R” etched in curb to locate service.
    b. Look for water or reclaim water service stake.
    c. Look for service line above grade (see figure 2).

Figure 2. Water service location identified by service line above grade

4. Check service location
    a. Utilize site plan from inspection board to verify driveway location.
    b. Check to make sure service is out of driveway. If service is located under driveway, put work order on hold and do not install. Contact the Utilities Maintenance Coordinator (UMC).
    c. If service location is not verified check with the Utilities Maintenance Coordinator (UMC).
    d. Insure the water is on at the curb stop by turning on the curb stop and flushing water.
5. Locate backflow device
    a. Record the following fields for later input into Syclo.
        ii. Make and model
        iii. Serial number
        iv. Size

v. Location on property

WARNING: If no backflow is installed, no meters or meter box will be installed and a trip charge will be charged to the customer.

6. Review Standard drawings and specifications for meter installation (see figures 3 through 7).

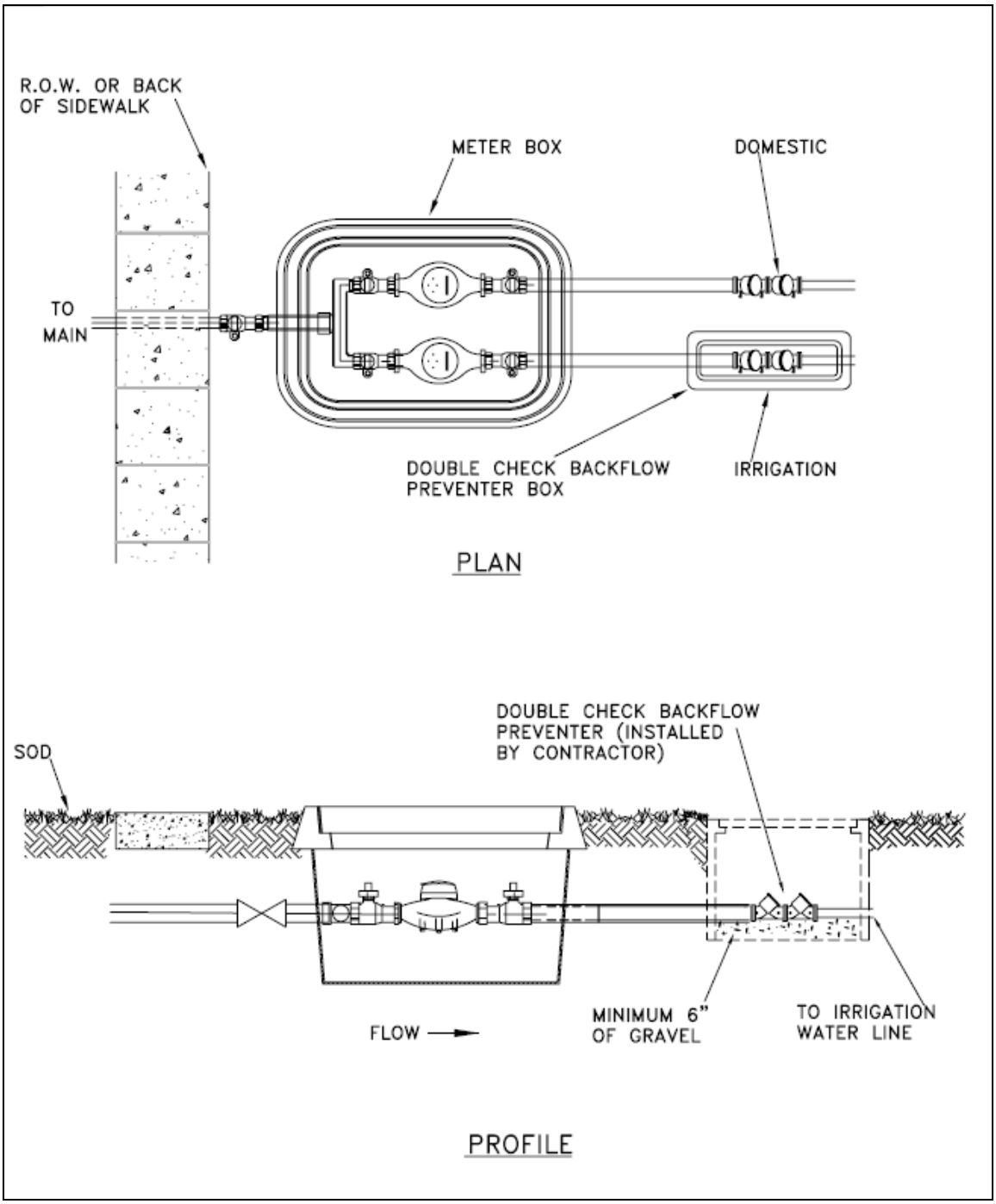


Figure 3. Orange County Utilities Standard Drawings double Service detail

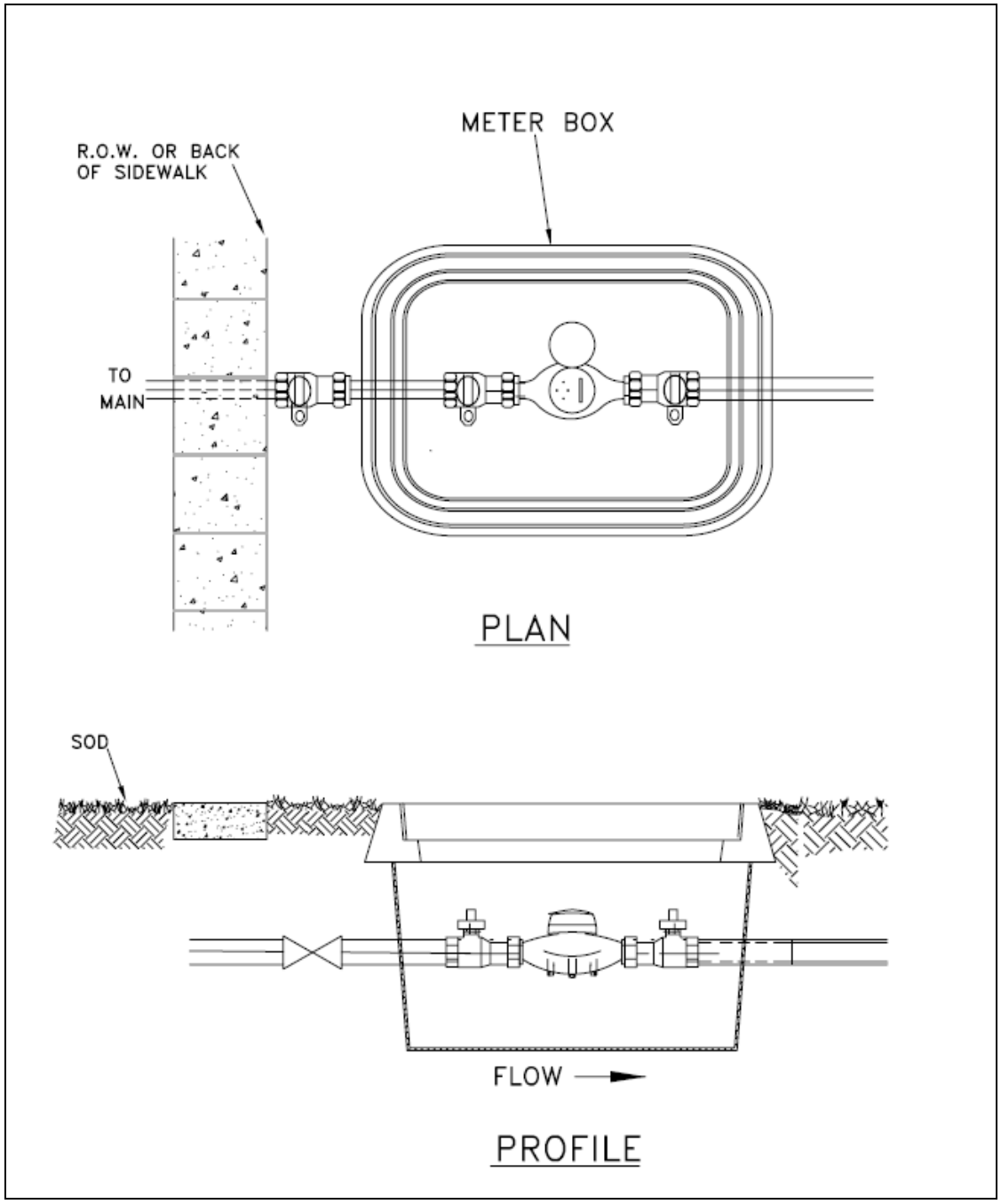


Figure 4. Orange County Utilities Standard Drawings single service detail

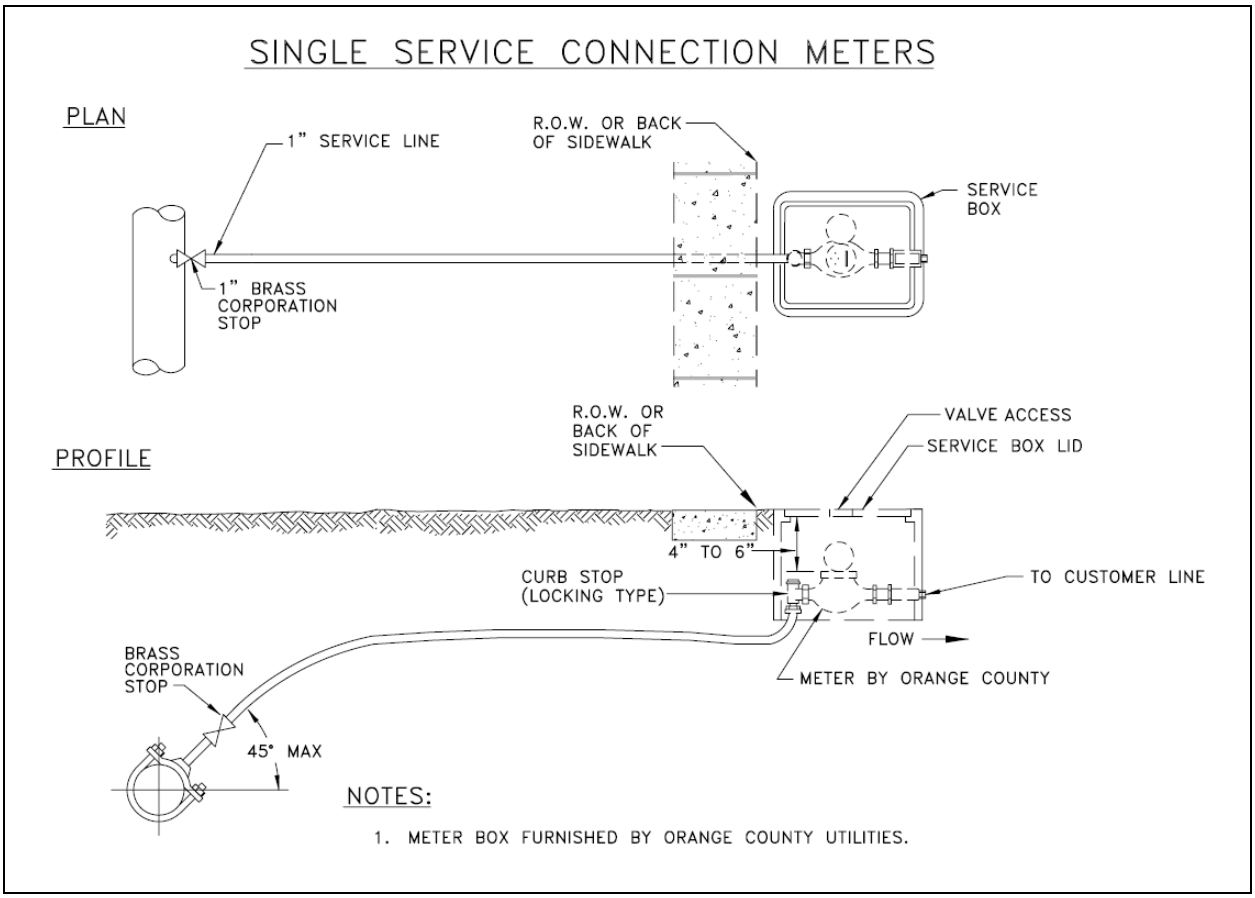


Figure 5. Single Service connection meters

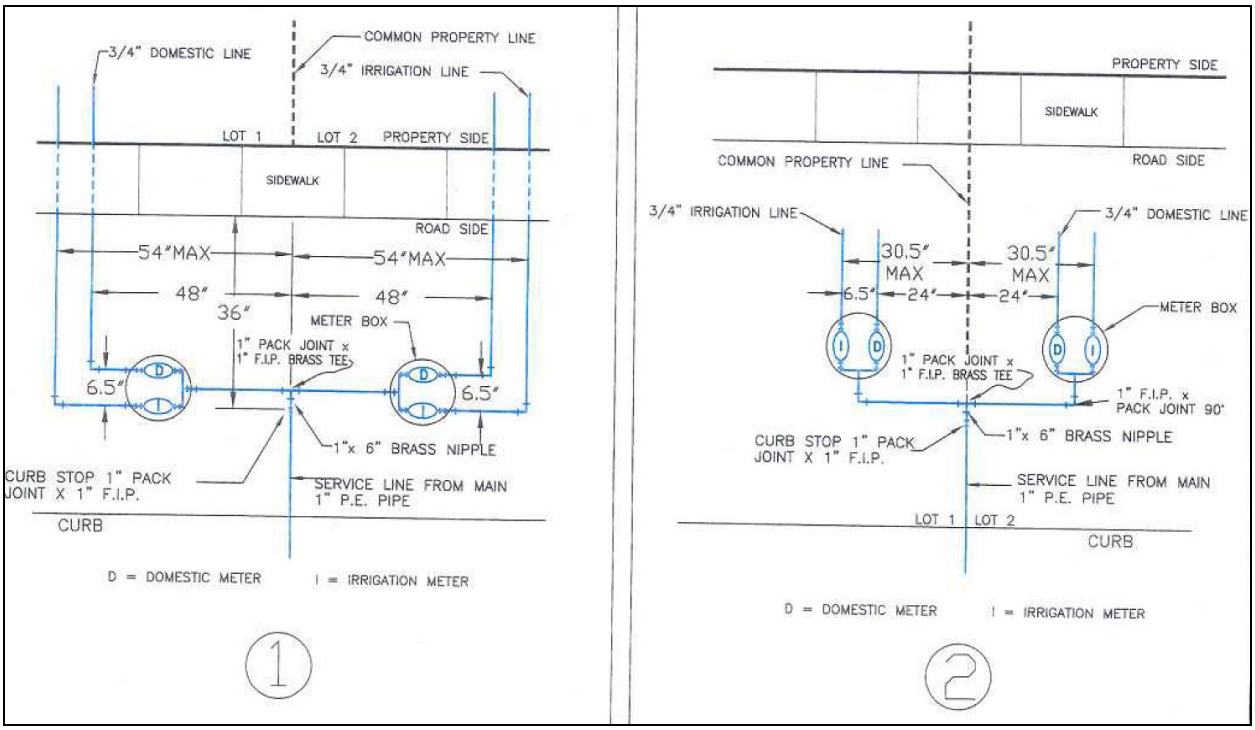


Figure 6. Double water service detail

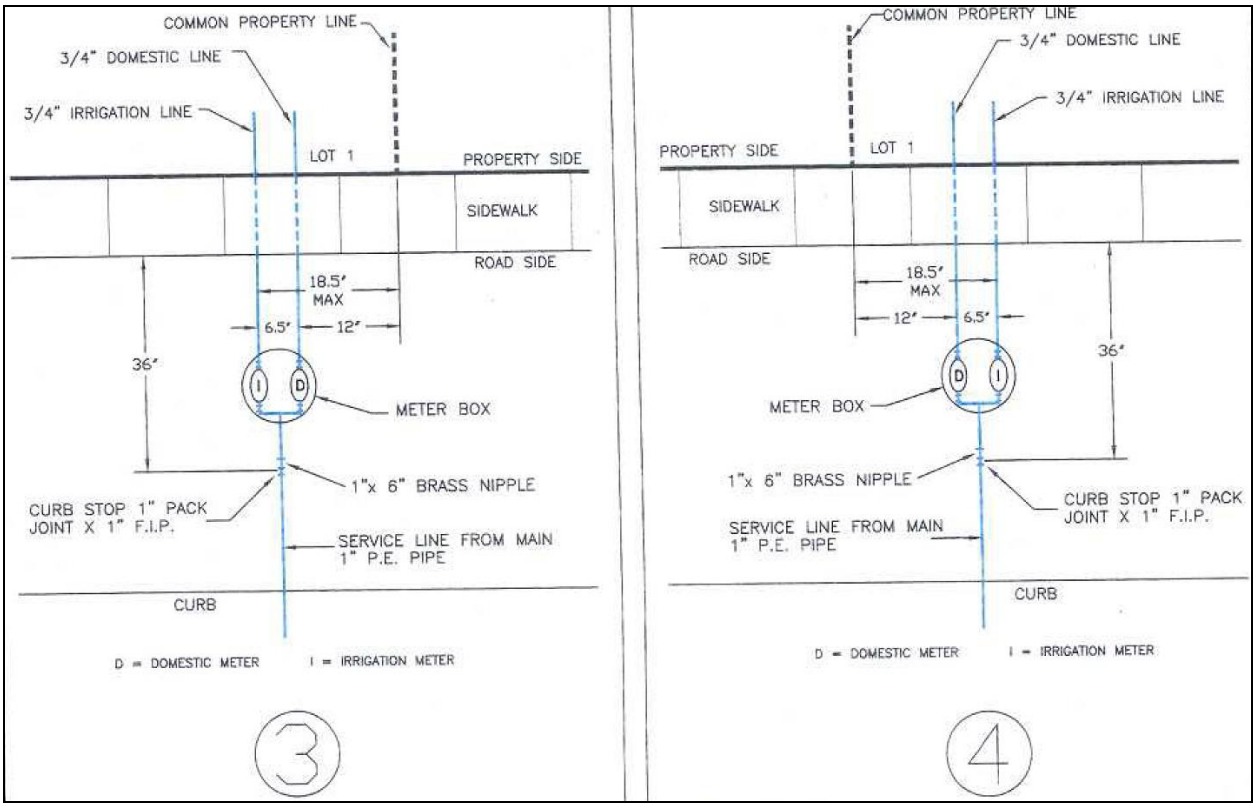


Figure 7. Single water service detail

7. Piped box and meter installation:
   a. Excavate a hole large enough for a box and to make the connection easily (see figure 8).

Figure 8. Excavation

b. Create firm bedding and proper grade by tamping area.

c. Determine type of box to be used and whether it is single or double piped (see figure 9).

Figure 9. Double Piped Meter Box

d. Remove necessary spacers from piped meter box by loosening couplings by hand or meter wrench if necessary (see figure 10).

Figure 10. Removing the spacer

NOTE: Make sure to install meter with the correct direction of flow, look for the arrow. Flow is single inlet towards double outlet (see figure 13).

e. Install meter with two washers on each side and hand tighten couplings (see figure 13).

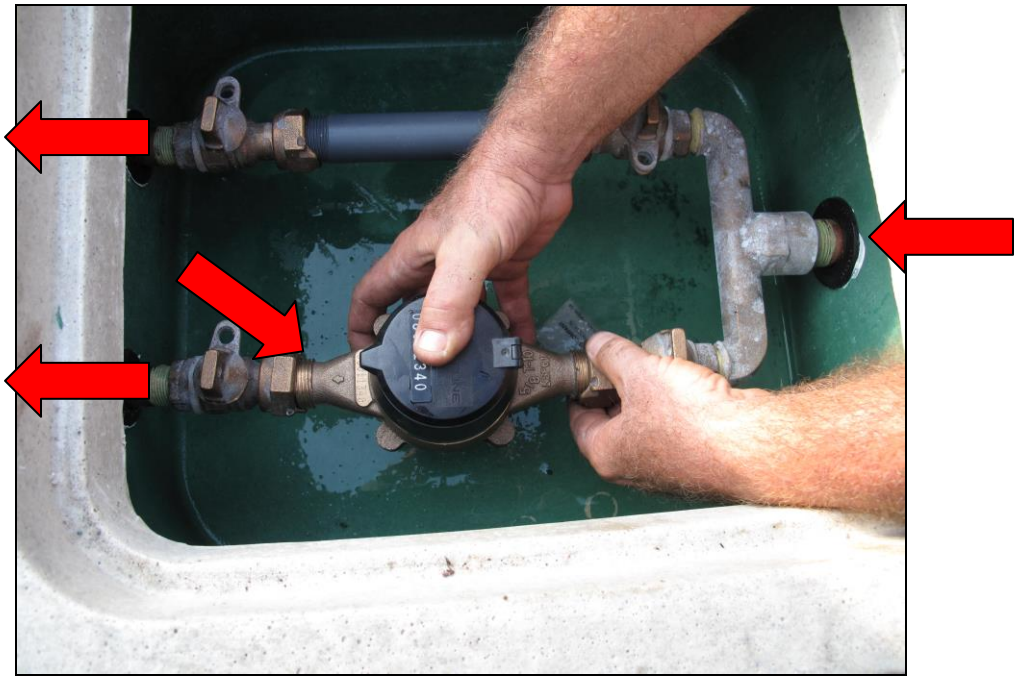


Figure 13. Meter and direction of flow

f. Remove thread protector and apply joint compound to inlet brass nipple; install thread by compression elbow (see figures 14 and 15).

g. Tighten and direct to desired direction using a meter wrench.

Figure 14. Joint Compound

Figure 13. Thread by compression elbow

h. Place the box in the excavated space. Make sure to place correctly with direction of flow from single inlet where service line connects to double outlet towards house. Cut existing polyethylene tubing using the poly cutter to fit to the compression 90º on the piped meter box (see figure 14 and 15).

Figure 14. Cutting Polyethylene tubing

i. Install the piece of poly to compression coupling on box and tighten using meter wrench. Tighten bolt using a nut driver (see figure 16).

Figure 16. Tightening bolt on compression piece

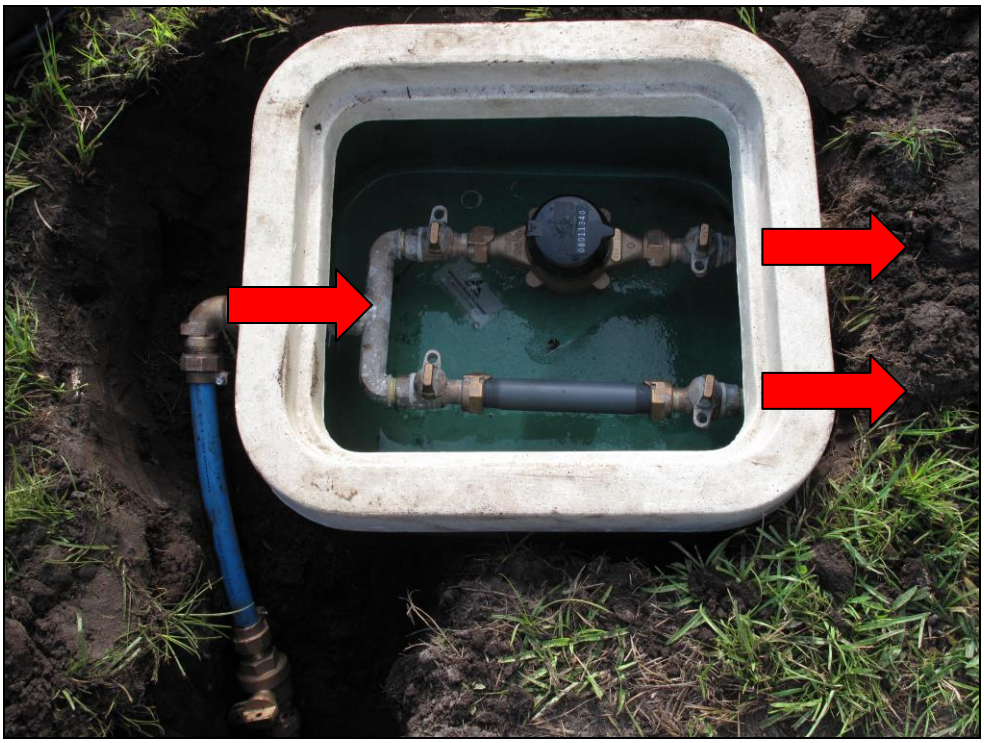


Figure 16. Piped meter box connected to service line and direction of flow towards property

j. Open the curb stop on the service line and check for leaks (see figures 17 and 18).

Figure 17. Closed Curb Stop

Figure 18. Opened Curb Stop

k. Check for any leaks from the service line to the first curb stop inside the meter box. Tighten any fittings using two meter wrenches.

l. Tighten meter installed, using a meter wrench (see figure 19).

Figure 19: Tightening meter

m. Open the first curb stop in the meter box before the meter and check for any leaks. Tighten any fittings using meter wrenches (see figure 20).

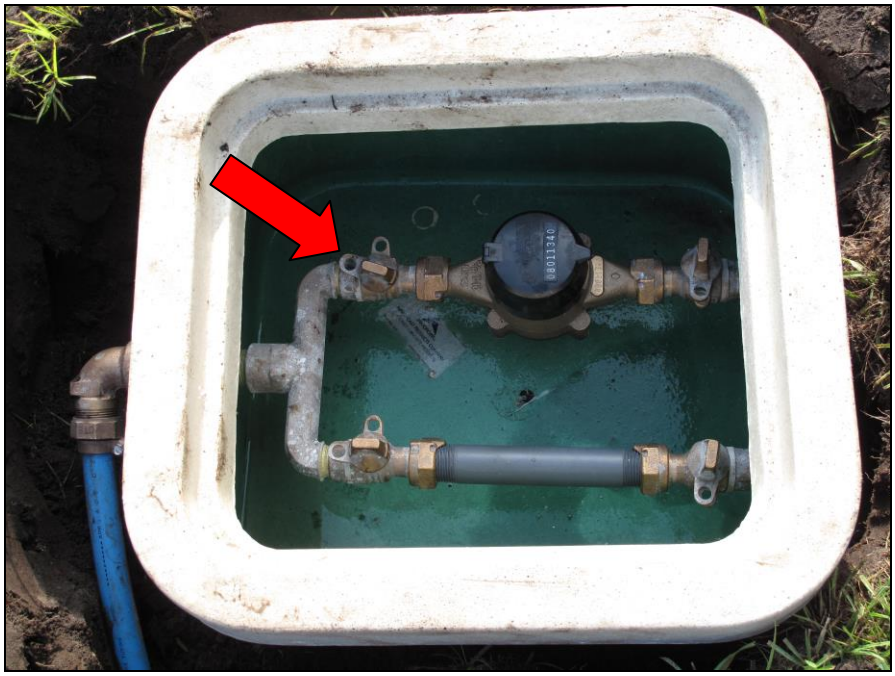


Figure 20. First curb stop opened

n. Remove thread protector on outlet nipple and open the second curb stop and flush water through the meter for 20 gallons. Water should be clear and free from air. Make sure meter gauge is running to indicate if the meter is working properly (see figure 21).

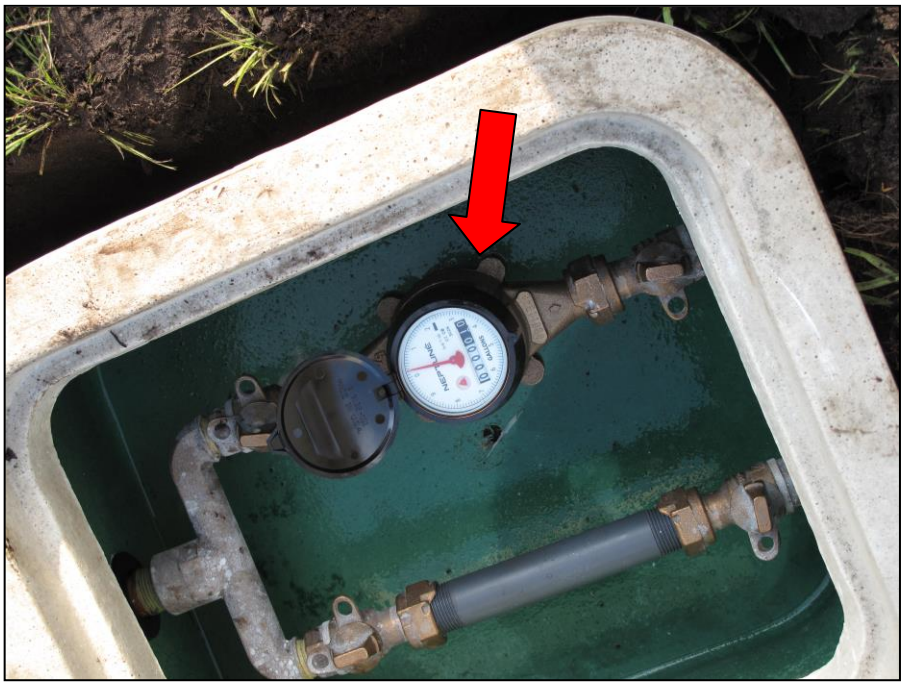


Figure 21. Flushing meter

o. Lock off additional service in box if meter is not installed (see figure 22).

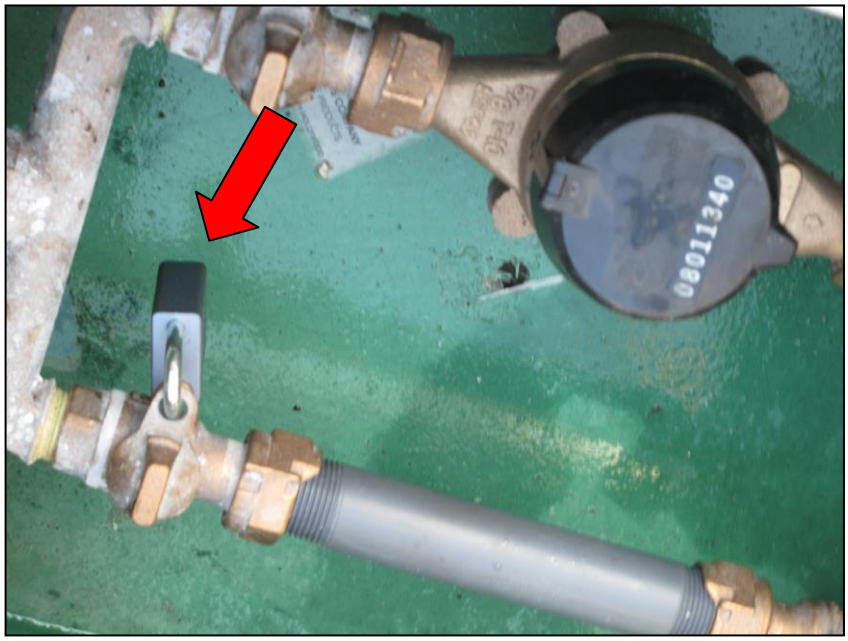


Figure 22. Locked off

8. Backfilling:
   a. Set meter box to proper grade. Set box to anticipated slope from sidewalk to curb. Utilize top of curb as a guide for grade of yard. Set top of box two inches above curb line to allow for maintaining a level surface after sod installation.
   b. Backfill and tamp around box (see figure 23).

Figure 23. Backfilled

c. For new construction, place two stakes by the piped meter box and wrap orange ribbon around both stakes (see figure 24).

Figure 24. Orange ribbon

9. Complete the work order with Syclo Data Entry (see SOP # FS-CT-05 Syclo Data Entry).
   a. Enter the Parts popup window.
      i. Click on Actual Material, select the *Stock* tab, and then enter the items utilized during the procedure (see figure 25).

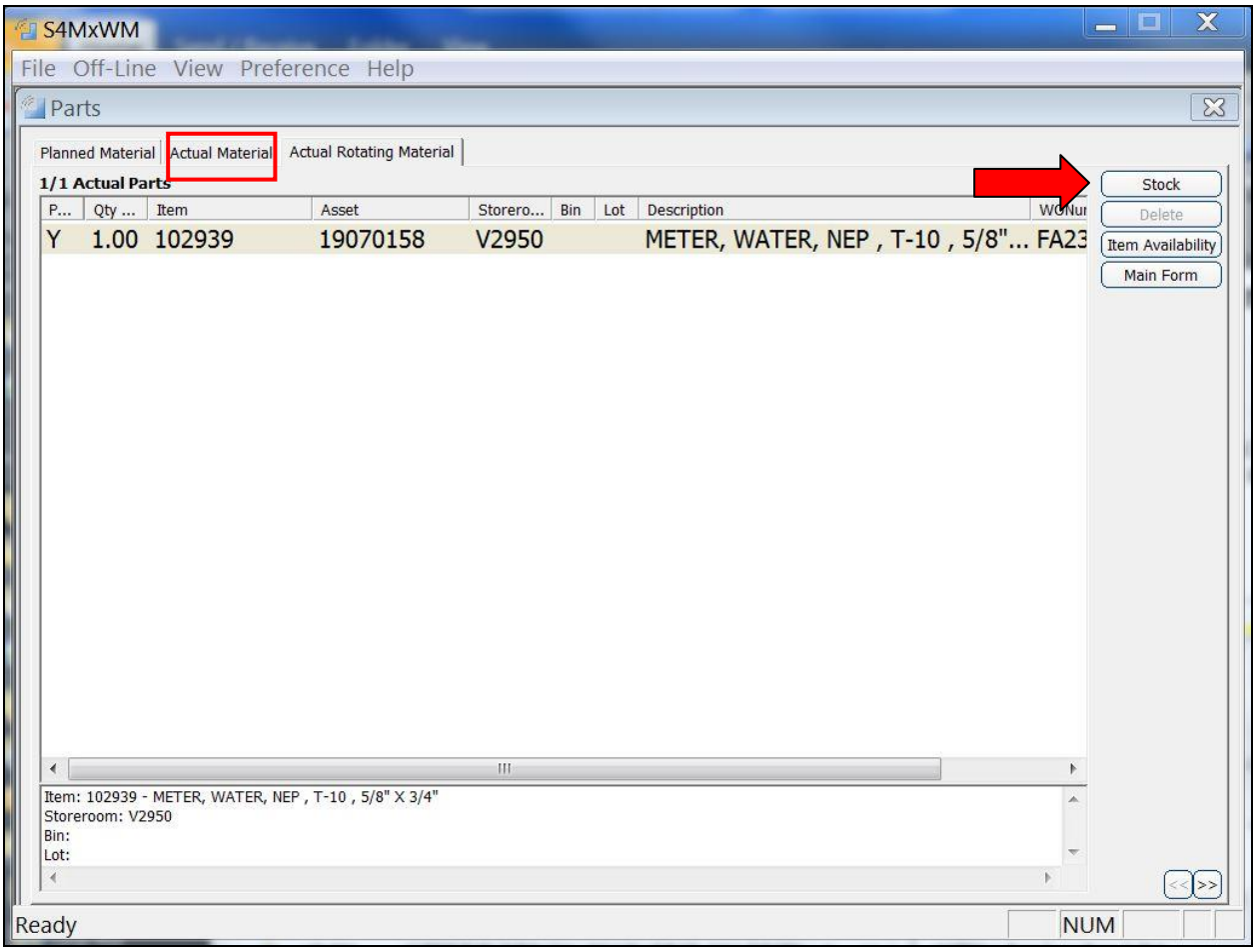


Figure 25. Maximo Parts

b. Select the Work Log tab.

   i. Enter work log notes in the Note field.

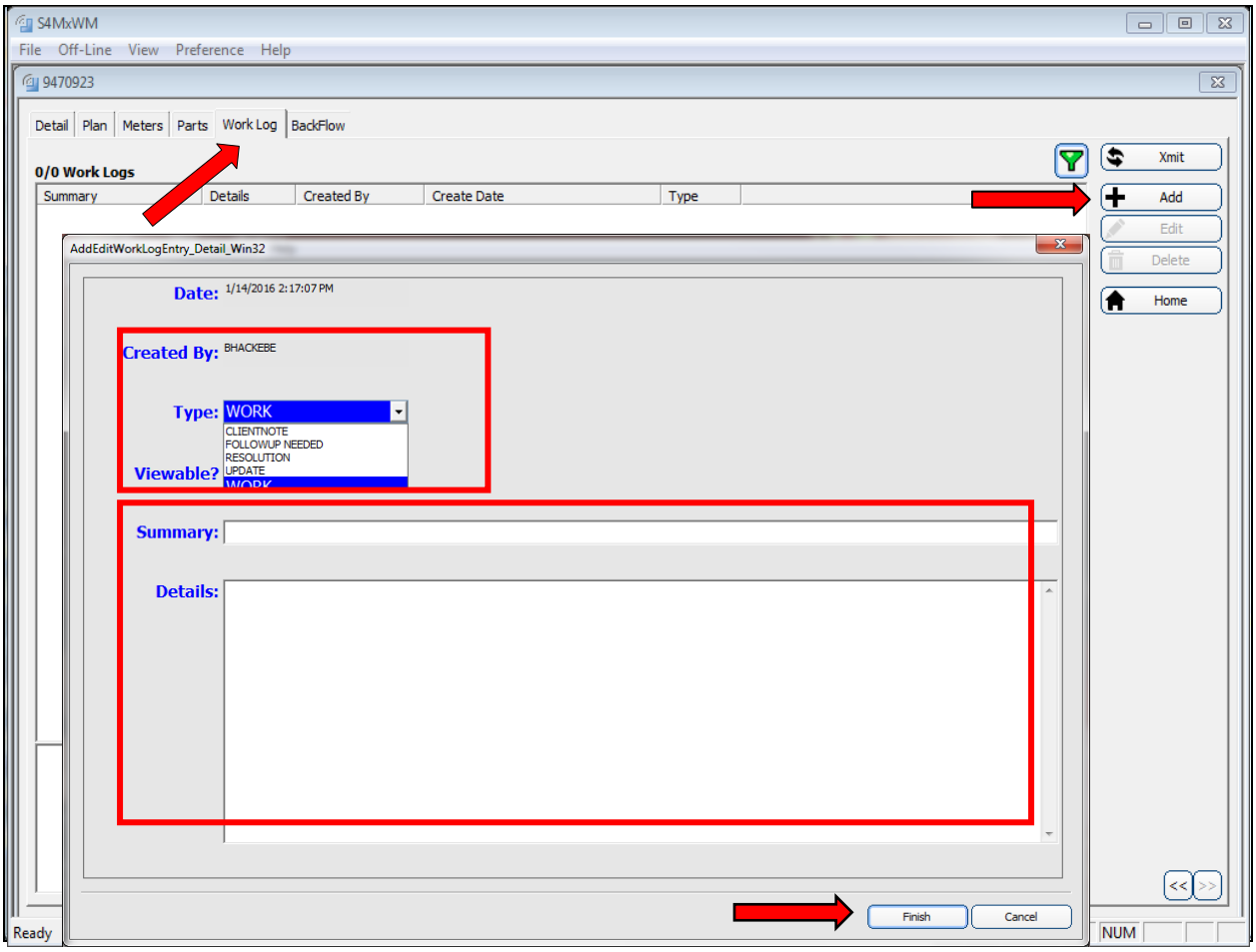


Figure 26. Work Log

c. Select the Backflow tab.
   i. Enter the information into the appropriate fields.

d. Select the Field Activity Reporting tab and fill in the following (see figure 27).
   i. Location indicator
   ii. Register 1 Reading
   iii. Click Finish.

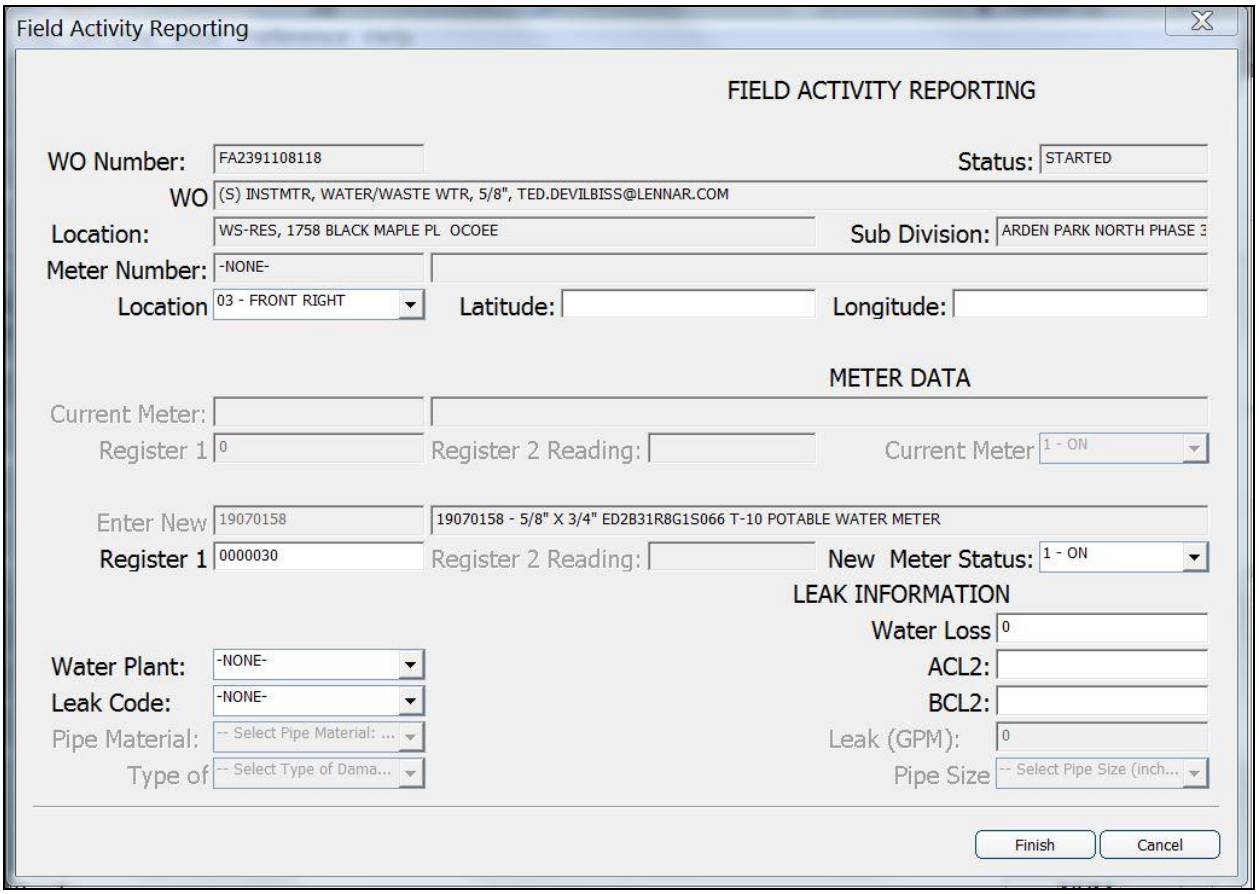


Figure 27. Maximo Field Activity Reporting

e. Within the Completion Info popup window, enter the following fields (see figure 28).

   i. Failure: SERVICE POINT

   ii. Problem: METER INSTALL

   iii. Cause: CIS-CUSTOMER INFORMATION SYSTEM

NOTE: If the meter/meter box was not installed due to some fault of the builder, a trip charge must be assessed. In the Remedy drop down menu, click on the choice explaining the reason for not installing the meter/meter box: NO PERMIT BOARD AT LOCATION, CONFLICT, NO BACKFLOW DEVICE INSTALLED, or INACCESSABLE). In the note box, write an explanation of the choice selected.

   iv. Remedy: Enter INSTMR – METER INSTALL if meter was installed.

   v. Note: Type in notes about the problems encountered or installation process.

   vi. Click Next to get to the main screen. This procedure is now complete.

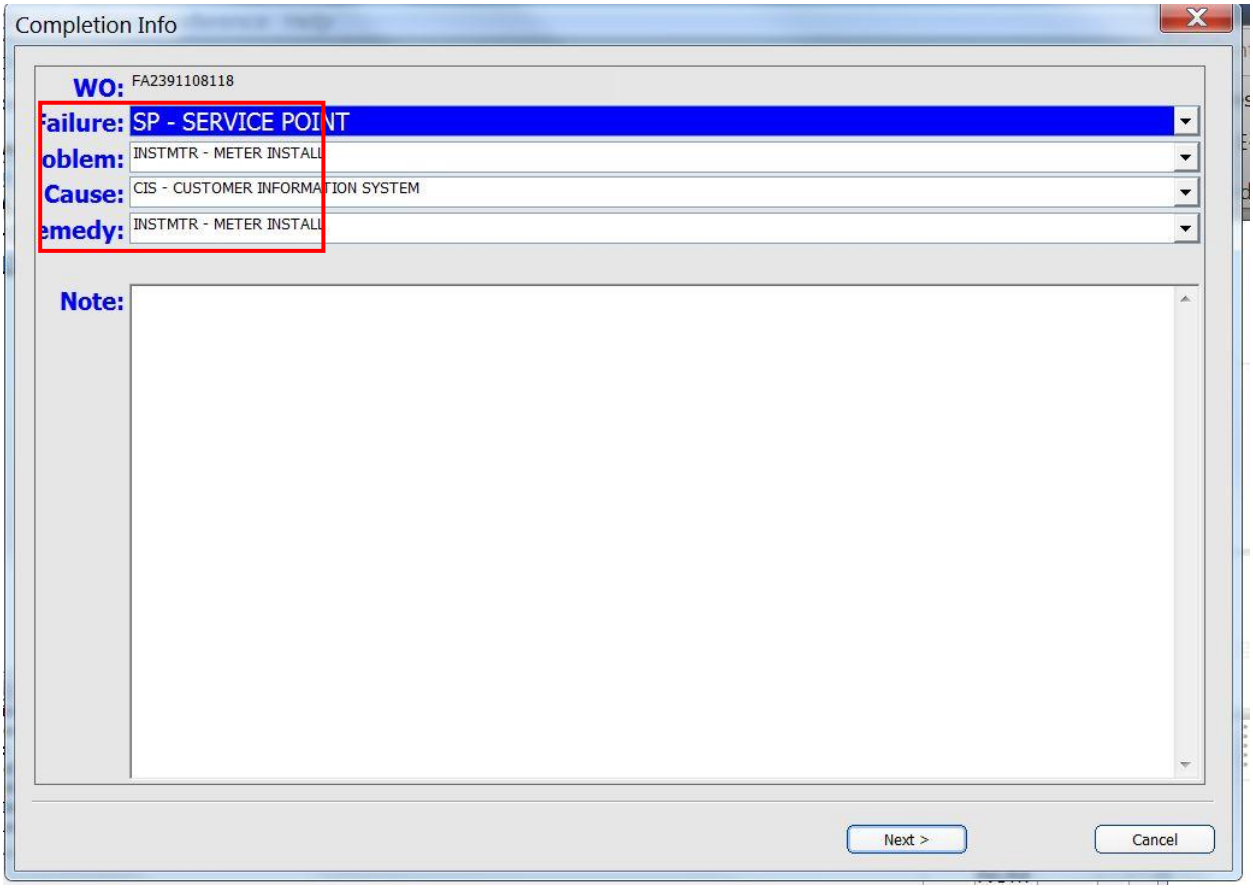


Figure 28. Maximo Completion Info

vii. Exit the Syclo application and be sure to pick up any tools utilized in the procedure.

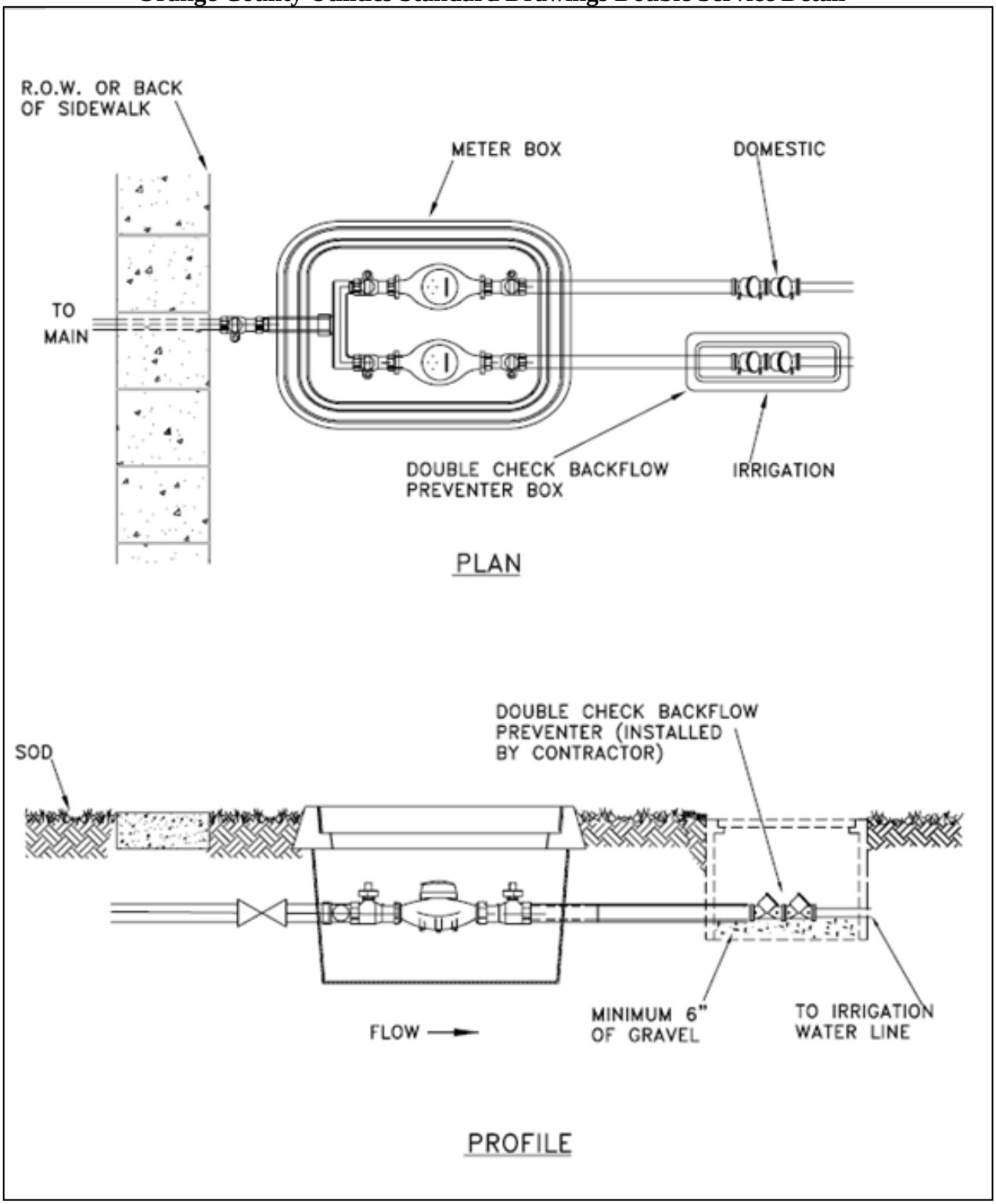
REVISION LOG:

Revision Date	Section	Description	Author's Initials	Section Manager or Division Manager Approval
11/10/2009	All	New SOP format and enhanced content based on previous SOP # 98-M-13, "Installation of New Account Domestic Meter"	N/A	N/A
9/18/2015	B. References	Updated reference SOPs and Water Distribution Systems Operation and Maintenance.	N/A	N/A
9/18/2015	H. Procedure	Added Section H5: "Locate backflow device" and WARNING.		
9/18/2015	H. Procedure	Replaced Section H8 and H9 with Section H9: Syclo Data Entry		
9/18/2015	All	Updated formatting: All picture borders and captions, document spacing and fonts, and new Syclo screenshots to comply with current SOP formatting.		
7/9/2019	H	Figure 25-28 were updated	CJ	JRS

Prepared By:	**SME:**	**Section Manager Approval & Date:**
Clifford Alejos	Ed Puskaric	 Digitally signed by Robert J. Dudas DN: cn=Robert J. Dudas, c=US, o=Distribution Section, ou=Water Divison, email=bob.dudas@ocfl.net Date: 2009.11.10 15:03:13 -05'00'

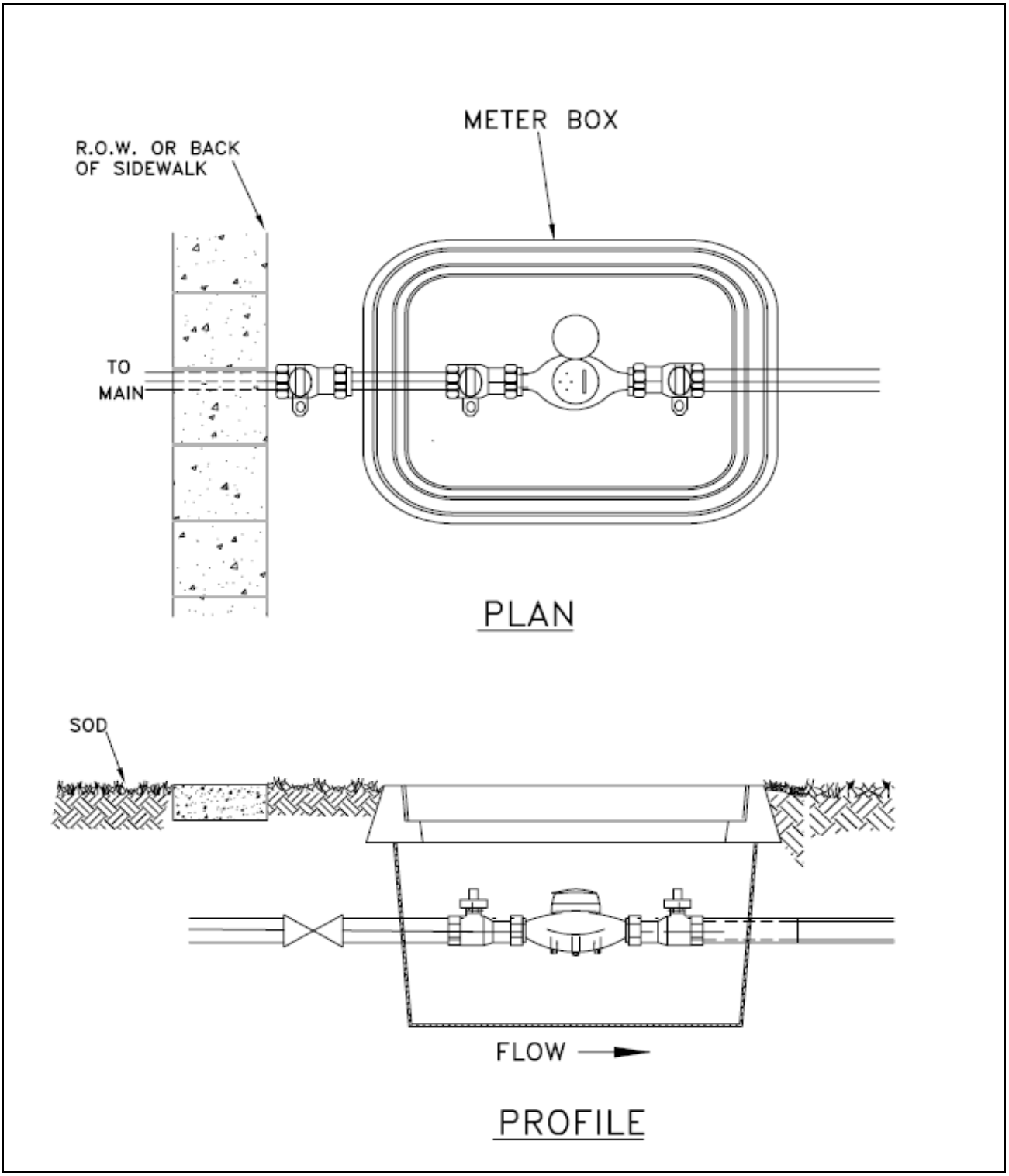
Attachment 1

Orange County Utilities Standard Drawings Double Service Detail

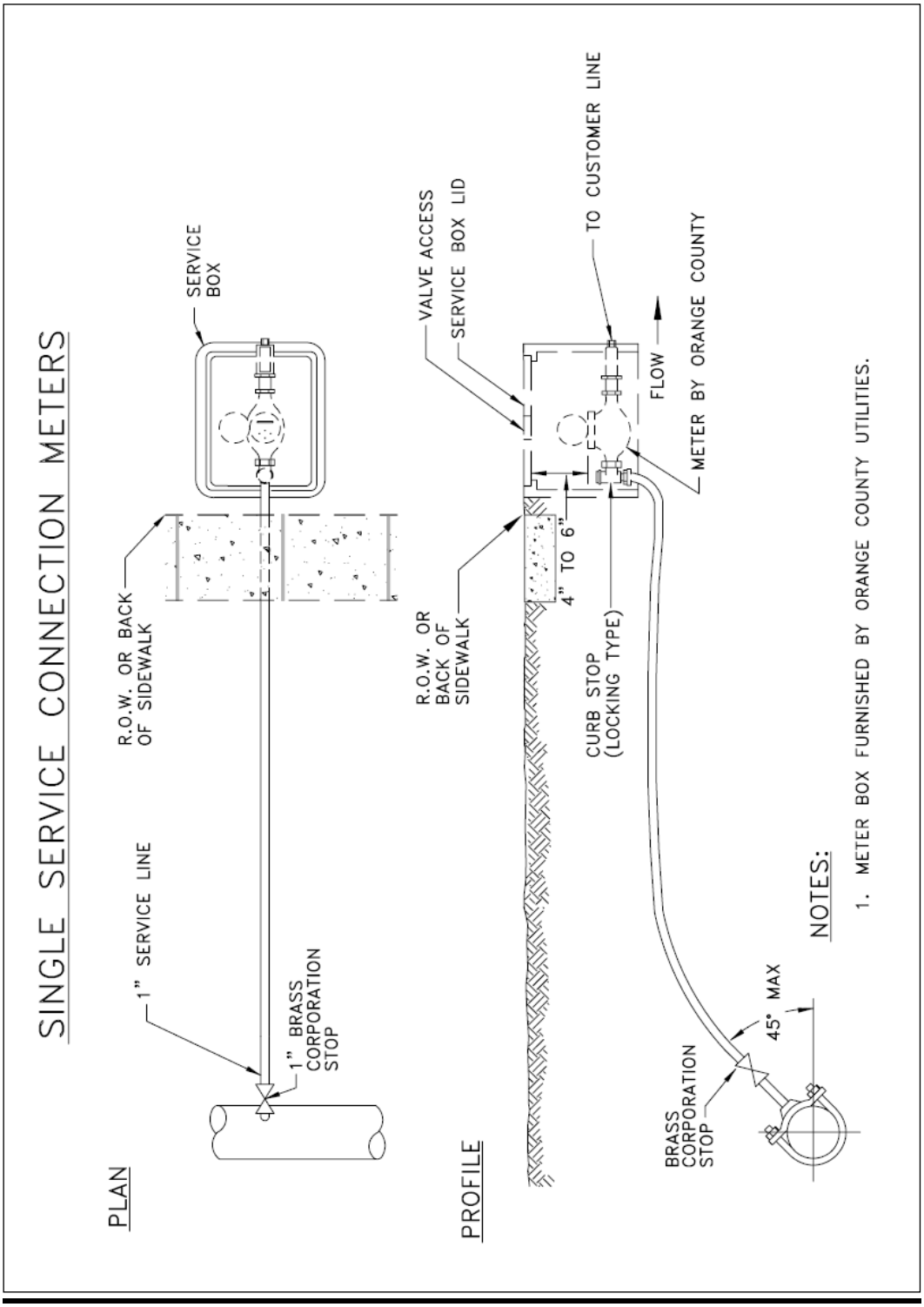


Attachment 2

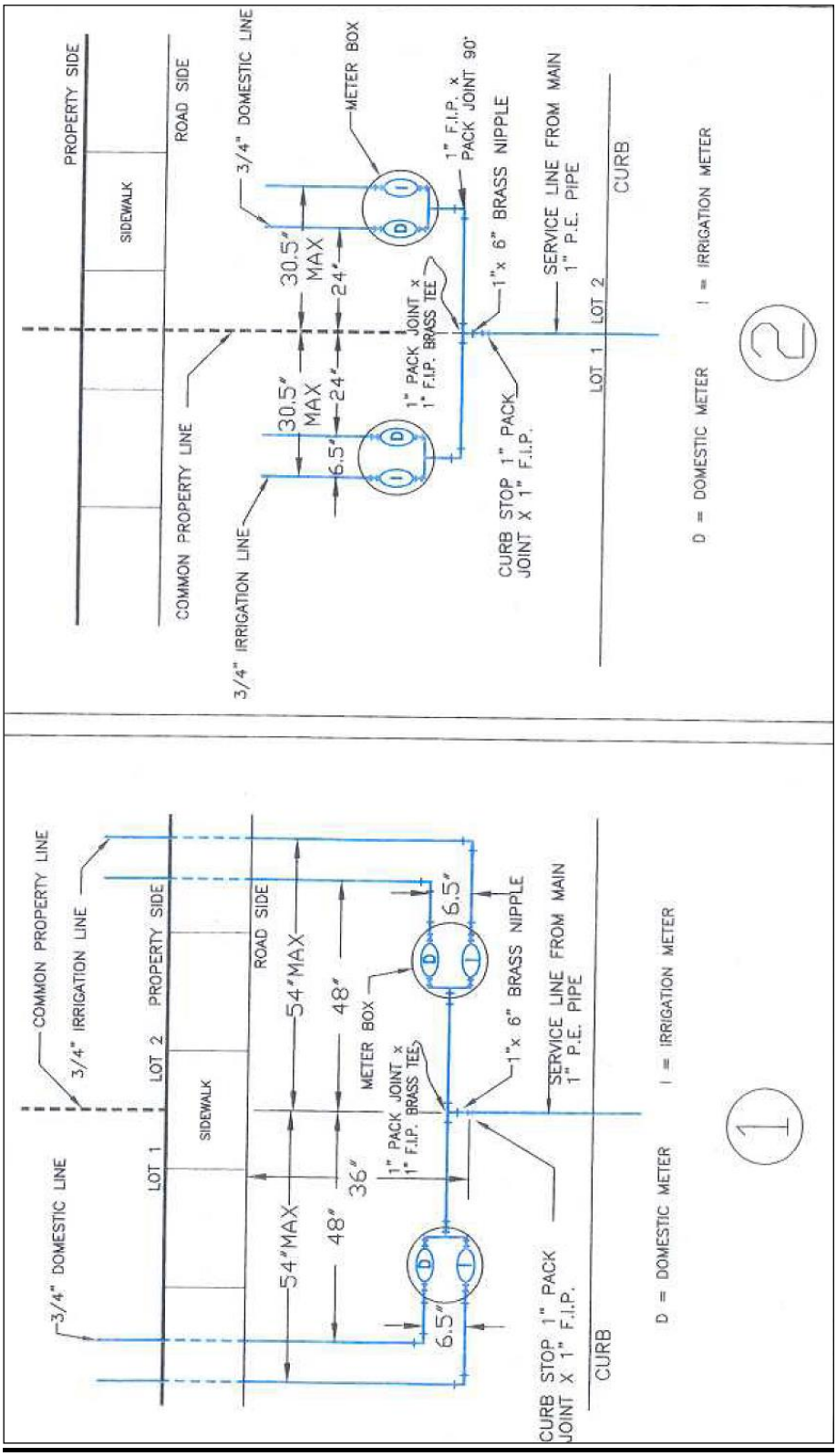
Orange County Utilities Standard Drawings Single Service Detail



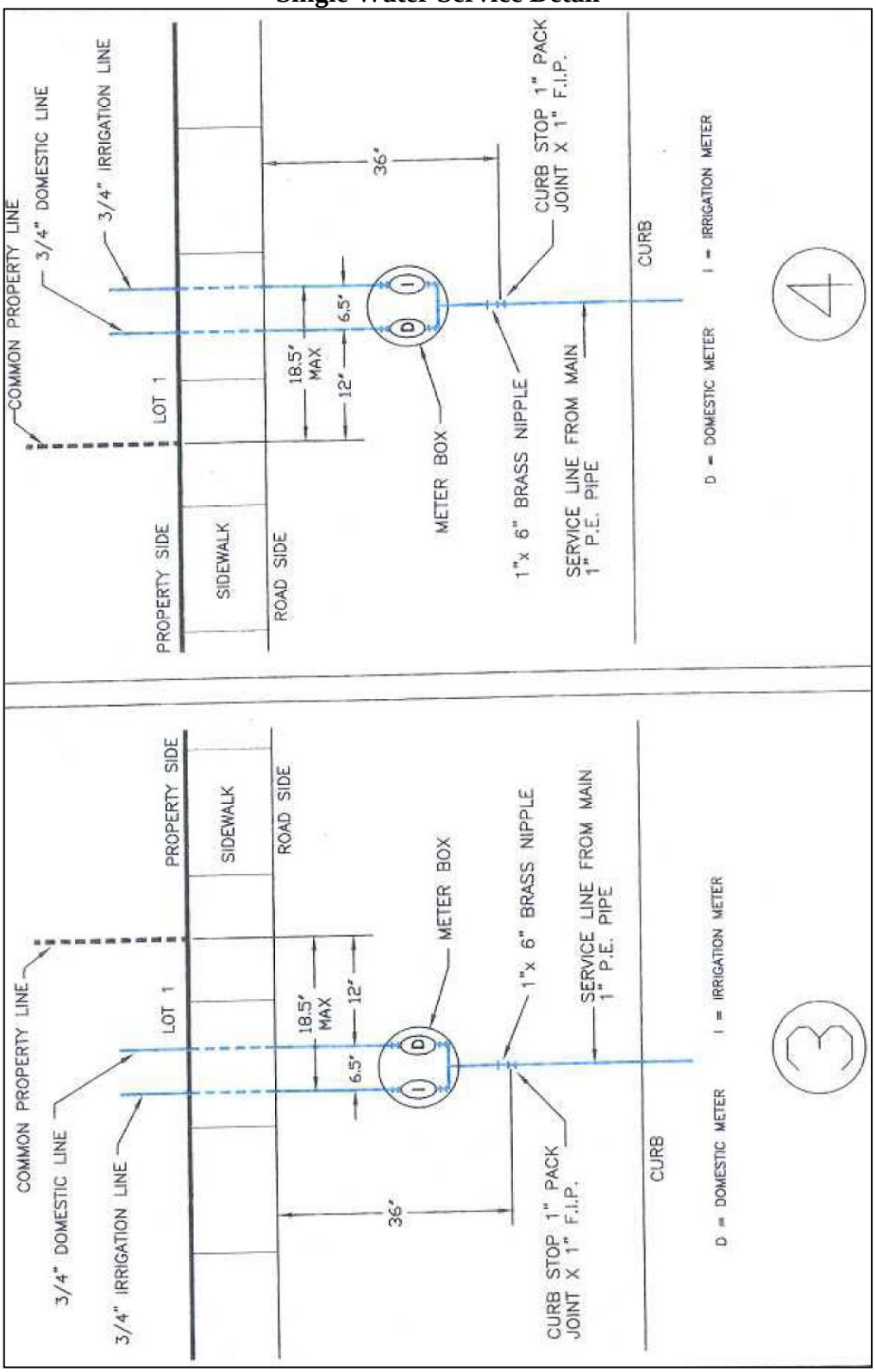
Attachment 3
Single Service Connection Meters



Attachment 4
Double Water Service Detail



Attachment 5
Single Water Service Detail



APPENDIX B

ORANGE COUNTY UTILITIES

FORMS

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APPENDIX B FORMS

Meter Installation Form

This form is to be utilized for the submittal of data in accordance with the requirements outlined in Specification 01001 “General Work Requirements”, section 1.04 E.

METER REPLACEMENT

Report Label	Field Value	Provided by	Description
Work Order	WONUM	OCU	Work order #
Description	DESCRIPTION	OCU	Description of work to be done
Location	LOCATION	OCU	OCU locational information
Location Description	DESCRIPTION	OCU	Description of location
Asset	ASSETNUM	OCU	Asset #
Failure Class	Failure Code	OCU	Failure Classification - reporting
Problem Code	PROBLEMCODE	OCU	Root cause reporting information
Cause	Failure Code	Contractor	Root cause reporting information *see value list
Remedy	Failure Code	Contractor	Root cause reporting information *see value list
Status	STATUS	OCU	Work order status
Reported Date	REPORTDATE	OCU	Date work order was made
Work Group	PERSONGROUP	OCU	Internal work routing
Assigned to	WOLABLNK	OCU	Internal person assignment
Current Meter	WO4	OCU	Number of meter currently installed
Current Meter Reading	CUR_REG_READING1	Contractor	Reading on meter being removed
New_reg_reading1	NEW_REG_READING1	Contractor	Reading on meter being installed – potable meter
Meter No. 2 Reading	WO12	Contractor	Reading on meter being installed-irrigation
Actual Start	ACTSTART	Contractor	When technician started job including travel to job
Actual Finish	ACTFINISH	Contractor	When technician completed job
Meter Cycle	Mr_cyc_cd	OCU	Internal information
Meter Route	Mr_rte_cd	OCU	Internal routing info
Log Entry Type	Type	Contractor	Type of Work Log Entry –always input WORK
Log Entry Summary	Summary	Contractor	Short description of the work log entry. Limited to 100 characters
Log Entry Long Description	Details	Contractor	To be used in conjunction with Summary, if summary is longer than 100 characters

APPENDIX B FORMS

Meter Installation Form

NEW METER INSTALLATION

Report Label	Field Value	Provided By	Description
Work Order	WONUM	OCU	Work order #
Description	DESCRIPTION	OCU	Description of work to be done
Location	LOCATION	OCU	OCU locational information
Location Description	DESCRIPTION	OCU	Description of location
Failure Class	Failure Code	OCU	Failure Classification - reporting
Problem Code	PROBLEMCODE	OCU	Root cause reporting information
Cause	Failure Code	OCU	Root cause reporting information
Remedy	Failure Code	Contractor	Root cause reporting information *see value list
Status	STATUS	OCU	Work order status
Work Group	PERSONGROUP	OCU	Internal work routing
Assigned to	WOLABLNK	OCU	Internal person assignment
New Meter	WO12	OCU	Meter number
New Meter Reading	NEW_REG_READING1	Contractor	Reading on meter being installed
Actual Start	ACTSTART	Contractor	When technician started job including travel to job
Actual Finish	ACTFINISH	Contractor	When technician completed job
Meter Cycle	Mr_cyc_cd	OCU	Internal information
Meter Route	Mr_rte_cd	OCU	Internal routing info
Reported Date	REPORTDATE	Contractor	Date work order was made
Log Entry Type	Type	Contractor	Type of Work Log Entry –always input WORK
Log Entry Summary	Summary	Contractor	Short description of the work log entry. Limited to 100 characters
Log Entry Long Description	Details	Contractor	To be used in conjunction with Summary, if summary is longer than 100 characters

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APPENDIX B FORMS

Meter Installation Form

METER REPLACEMENT AND NEW METER INSTALL FAILURE REPORTING VALUE LIST

Causes for RRMTR and STUCK (Meter Replacement)	Description
AGE	CUSTOMER INFORMATION SYSTEM
HIGHRDG	HIGH MILAGE ON METER
BRKGLASS	BROKEN GLASS
STUCK	STUCK METER
FOGGED	FOGGED
MISSING	MISSING
BNFLWTST	BENCH FLOW TEST (METER SHOP)
Remedies for RRMTR and STUCK (Meter Replacement)	Description
COMPLETE	COMPLETE
NOACTION	NO ACTION TAKEN
Remedies for INSTMTR (Meter Installation)	Description
INSTMTR	METER INSTALL
NOPERMIT	NO PERMIT BOARD AT LOCATION

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APPENDIX B FORMS

Meter Installation Form

CONFLICT	CONFLICT
NOACCESS	INACCESSABLE
NOBF	NO BACKFLOW DEVICE INSTALLED

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METER BOX REPLACEMENT

Report Label	Field Value	Provided by	Description
Work Order	WONUM	OCU	Work order #
Description	DESCRIPTION	OCU	Description of work to be done
Location	LOCATION	OCU	OCU locational information
Location Description	DESCRIPTION	OCU	Description of location
Asset	ASSETNUM	OCU	Asset #
Failure Class	Failure Code	OCU	Failure Classification - reporting
Problem Code	PROBLEMCODE	OCU	Root cause reporting information
Cause	Failure Code	Contractor	Root cause reporting information *see value list
Remedy	Failure Code	Contractor	Root cause reporting information *see value list
Status	STATUS	OCU	Work order status
Reported Date	REPORTDATE	OCU	Date work order was made
Work Group	PERSONGROUP	OCU	Internal work routing
Assigned to	WOLABLNK	OCU	Internal person assignment
Current Meter	WO4	OCU	Number of meter currently installed
Current Meter Reading	CUR_REG_READING1	Contractor	Reading on meter being removed
New_reg_reading1	NEW_REG_READING1	Contractor	Reading on meter being installed – potable meter
Meter No. 2 Reading	WO12	Contractor	Reading on meter being installed-irrigation
Actual Start	ACTSTART	Contractor	When technician started job including travel to job

APPENDIX B FORMS

Meter Installation Form

Actual Finish	ACTFINISH	Contractor	When technician completed job
Meter Cycle	Mr_cyc_cd	OCU	Internal information
Meter Route	Mr_rte_cd	OCU	Internal routing info
Log Entry Type	Type	Contractor	Type of Work Log Entry –always input WORK
Log Entry Summary	Summary	Contractor	Short description of the work log entry. Limited to 100 characters
Log Entry Long Description	Details	Contractor	To be used in conjunction with Summary, if summary is longer than 100 characters

~~**Failure reporting value list**~~

~~Causes for RRMTR and STUCK (Meter Replacement)~~	~~Description~~
~~AGE~~	~~CUSTOMER INFORMATION SYSTEM~~
~~HIGHRDG~~	~~HIGH MILAGE ON METER~~
~~BRKGLASS~~	~~BROKEN GLASS~~
~~STUCK~~	~~STUCK METER~~
~~FOGGED~~	~~FOGGED~~
~~MISSING~~	~~MISSING~~
~~BNFLWTST~~	~~BENCH FLOW TEST (METER SHOP)~~
~~-~~	~~-~~
~~Remedies for RRMTR and STUCK (Meter Replacement)~~	~~Description~~
~~COMPLETE~~	~~COMPLETE~~
~~NOACTION~~	~~NO ACTION TAKEN~~
~~Remedies for INSTMTR (Meter Installation)~~	~~-~~
~~Failure Code~~	~~Description~~
~~INSTMTR~~	~~METER INSTALL~~

APPENDIX B FORMS

Meter Installation Form

~~NOPERMIT~~	~~NO PERMIT BOARD AT LOCATION~~
~~CONFLICT~~	~~CONFLICT~~
~~NOACCESS~~	~~INACCESSABLE~~
~~NOBF~~	~~NO BACKFLOW DEVICE INSTALLED~~

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METER BOX REPLACEMENT FAILURE REPORTING VALUE LIST

Causes for MTRBOX (Meter Box)	Description
CIS	Customer Information System
Remedies for CIS (Meter Box)	Description
NOACTION	No action taken
RPMTRBX	Replace meter box

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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 Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Air Release	ARV Enclosure	**All ARV above ground enclosures shall be vented with tamper proof locking device**						
		Water Plus Polyethylene Enclosure	131632 H30-B	Blue 44" Tall	131632 H30-P	Pantone 44"	131632 H30-G	Green 44" Tall
			171730 H40-B	Blue 30" Tall	171730 H40-P	Pantone 30"	171730 H40-G	Green 30" Tall
		Hot Box Vent Guard Fiberglass Enclosure	AVG2036 Encl GP3232 Base	Blue 36" Tall	AVG2036 Encl GP3232 Base	Pantone 36" Tall	AVG2036 Encl GP3232 Base	Green 36" Tall
			AVG2041 Encl GP3232 Base	Blue 41" Tall	AVG2041 Encl GP3232 Base	Pantone 41" Tall	AVG2041 Encl GP3232 Base	Green 41" Tall
		Safety-Guard/Hydro Guard	15100 Encl	Blue 34" Tall	15100 Encl	Pantone 34" Tall	15100 Encl	Green 34" Tall
	Air Release Valves	**Air Release Valves shall be Combination Type, 316 SS**						
		ARI	D-040SS	Combination	D-040SS	Combination	D-020 (SS)	Combination
		H-TEC	NA	NA	NA	NA	986 (316SS)	Combination
		Vent-O-Mat	Series RBX DN50	2"	Series RBX DN50	2"	RGX series	
	ARV Vault	**Air Release Valve Frame and Cover**						
		US Foundry	NA	NA	NA	NA	USF 7665-HH-HJ	
Blow Off	Auto Blow Off	**Automatic Blow Off Valve**						
		Hydro Guard	HG-1 Standard Unit	Automatic	NA	NA	NA	NA
	Blow Off Valve	**Blow Off Valve - Fits standard 5-1/4 inch Valve Box**						
		Kupferle Foundry Co	Truflo Series TF #550		Truflo Series TF #550		NA	NA
		Water Plus Corp	The Hydrant Plus Series VB 2000B		The Hydrant Plus Series VB 2000B		NA	NA
Casing Seals / Spacers	Casing End Seals	**Casing End Seals. Annular space between pipe and steel casing shall be brick and mortar with end seals to secure ends.**						
		Advance Products	Model AC and AW		Model AC and AW		Model AC and AW	
		BWM Company	Model WR and PO		Model WR and PO		Model WR and PO	
		Cascade Water Works	Model CCES		Model CCES		Model CCES	
		CCI Pipeline	Model ESW and ESC		Model ESW and ESC		Model ESW and ESC	
		Pipeline Seal & Insulator, Inc (PSI)	Model C and W		Model C and W		Model C and W	
		Power Seal	Model 4810ES		Model 4810ES		Model 4810ES	

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Casing Seals / Spacers	Casing spacer	**Casing spacers shall be a min. 8-inches wide for pipe 12" Dia or less or min. 12-inches wide for pipe 16 or greater , shall have a minimum 14 gauge 304 stainless steel shell/band, minimum 10 gauge 304 reinforced risers; minimum thickness of 0.090 EPDM or PVC interior liners, glass reinforces polymer or ultra high molecular weight polyethylene and 304 stainless bolts, nuts and washers.**						
		Advance Products	SSI8 / SSI12		SSI8 / SSI12		SSI8 / SSI12	
		BWM Company	BWM-SS-8 / SS-12		BWM-SS-8 / SS-12		BWM-SS-8 / SS-12	
		Cascade Water Works	Series CCS 8" / 12"		Series CCS 8" / 12"		Series CCS 8" / 12"	
		CCI Pipeline	Model CCS8 / CSS12		Model CCS8 / CSS12		Model CCS8 / CSS12	
		Pipeline Seal & Insulator, Inc (PSI)	Series S8G-2 / S12G-2		Series S8G-2 / S12G-2		Series S8G-2 / S12G-2	
Coatings	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenances - System 1 Zinc / Urethane / Fluoropolymer application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**						
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carbothane 133 HB	3.0 -5.0 mils	Carbothane 133 HB	3.0 -5.0 mils	Carbothane 133 HB	3.0 -5.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
			Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils	Hydroflon Series 700	2.0 - 3.0 mils
	Exterior Coatings for Exposed Metal Assets	**Coatings: Aerial pipe, hydrants, above ground piping, fittings, valves and Appurtenances - System 2 Zinc / Epoxy / Urethane application and color code per Section 3119 Coatings & Linings. Coating shall not be in contact with Potable water unless NSF 61 approved.**						
		Carboline	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils	Carbozinc 621	3.0 - 8.0 mils
			Carboguard 60	4.0 -6.0 mils	Carboguard 60	4.0 -6.0 mils	Carboguard 60	4.0 -6.0 mils
			Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils	Carboxane 950	2.0 - 3.0 mils
		Tnemec	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils	Zinc Series 90-97	2.5 - 3.5 mils
			Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils	Typoxy Series 27WB	4.0 -14.0 mils
			Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils	Hi-Build Epoxoline II Series N69	4.0 - 10.0 mils
			EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils	EnduraShield Series73	2.0 - 3.0 mils
		PPG / Ameron	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils	Amercoat 68HS	Min 3.0 mils
			Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils	Amercoat 385	4.0 - 6.0 mils
			Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils	Amercoat 450H	2.0 - 3.0 mils

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Fittings	Fittings	**Ductile Iron Fittings C153 SSB / C110 FLG: (Water & Reclaimed Water fittings shall cement lined or holiday free fusion bonded epoxy lined) (Wastewater fittings interior shall be Protecto 401 and holiday free)**						
		American	30" & up	FBE / Cement	30" & up	FBE / Cement	30" & up	Protecto 401
		Sigma		FBE / Cement		FBE / Cement		Protecto 401
		Star		FBE / Cement		FBE / Cement		Protecto 401
		Tyler Union & Clow		FBE / Cement		FBE / Cement		Protecto 401
Flow	Flow Meter	**Flow Meters With Replaceable Sensors**						
		EMCO	NA	NA	NA	NA	Unimag 4411E	
Hydrants	Hydrants	**Hydrants Shall open left, 1-1/2 Pentagon operating nut, NST hose & pumper thread, rotate 360 degrees, closed drains, epoxy on shoe in & out and 304 SS nuts & bolts below ground.**						
		American Flow Control	B-84-B (6 inch)		NA	NA	NA	NA
		Clow	Medallion 2545		NA	NA	NA	NA
		Mueller	Super Centurion 250		NA	NA	NA	NA
Joint Restraints	Ductile iron pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain ductile iron pipe to mechanical joint fittings, pipe and appurtenances.**						
		EBAA Iron Inc	Megalug Series 1100		Megalug Series 1100		Megalug Series 1100	
		Ford / Uni-Flange	UFR-1400		UFR-1400		UFR-1400	
		Sigma	OneLok Series SLD/SLDE		OneLok Series SLD/SLDE		OneLok Series SLD/SLDE	
		Smith Blair	Cam Lok Series 111		Cam Lok Series 111		Cam Lok Series 111	
		Star	Star Grip Series 3000		Star Grip Series 3000		Star Grip Series 3000	
		Tyler Union	TufGrip Series TLD		TufGrip Series TLD		TufGrip Series TLD	
	DIP Bell Joint Restraints (4"-12") (New & Existing)	**Bell Joint Restraints for Ductile Iron Pipe (4"-12") (New & Existing) - All restraints split serrated on bell and spigot ends. Pipe 16" and greater shall have restraint gaskets or locking bells. (Wastewater only for restraint of existing DIP FM)**						
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD	
		Ford / Uni-Flange	Uni-Flange Series 1390C		Uni-Flange Series 1390C		Uni-Flange Series 1390C	
		Sigma	PV-Lok Series PWP-C		PV-Lok Series PWP-C		PV-Lok Series PWP-C	
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165	
		Star	StarGrip Series 3100S		StarGrip Series 3100S		StarGrip Series 3100S	
		Tyler Union	TufGrip-Series 300C		TufGrip-Series 300C		TufGrip-Series 300C	
	DIP Bell Joint Restraints (16" & Greater)	**Ductile Iron Pipe Bell Joint Restraints for Ductile Iron Pipe (16" & Greater) - All restraints shall have a split back-up ring for the bell and a serrated or wedge action gland for the spigot end. New installation for water & reclaimed water piping 16" and greater shall have restraint gaskets or locking bells.**						
		EBAA Iron Inc	Series 1100HD	Existing Only	Series 1100HD	Existing Only	Series 1100HD	Existing Only
		Sigma	Series SSLDH	Existing Only	Series SSLDH	Existing Only	Series SSLDH	Existing Only
		Star	Series 3100S	Existing Only	Series 3100S	Existing Only	Series 3100S	Existing Only

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Joint Restraints	Ductile iron pipe Bell Joint Restraint Gaskets and Locking Bell (4" & Above)	**Bell Joint Restraint Gaskets and Locking Bell (4" & Above) Stainless Steel locking wedges built into the gasket-rubber. ANSI/AWWA C111/A21.11 Standard for Rubber-Gasket Joints for Ductile Iron Pressure Pipe. Ductile Iron Bell Joint Restraint for Push-On Pipe- Locking bell joint system that prevents joint separation and allows for joint deflection. Bells shall be painted red to verify restrained gasket.**						
		American	Fast Grip Gasket	Gasket	Fast Grip Gasket	Gasket	NA	NA
			Flex-Ring Joint	Bell Lock	Flex-Ring Joint	Bell Lock	NA	NA
			Lok-Ring Joint	Bell Lock	Lok-Ring Joint	Bell Lock	NA	NA
		Griffin	Talon RJ Gasket	Gasket	Talon RJ Gasket	Gasket	NA	NA
			Snap-Lok	Bell Lock	Snap-Lok	Bell Lock	NA	NA
		McWane Inc. DI Pipe Group	Sure Stop 350 Gasket	Gasket	Sure Stop 350 Gasket	Gasket	NA	NA
			Thrust-Lock	Bell Lock	Thrust-Lock	Bell Lock	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			Super-Lock	Bell Lock	Super-Lock	Bell Lock	NA	NA
		US Pipe	Field Lok 350 Gasket	Gasket	Field Lok 350 Gasket	Gasket	NA	NA
			Field Lok Gasket	Gasket	Field Lok Gasket	Gasket	NA	NA
			TR-Flex	Bell Lock	TR-Flex	Bell Lock	NA	NA
			HP Lok Restraint Joint	Bell Lock	HP Lok Restraint Joint	Bell Lock	NA	NA
	SS to DIP Transition Restraint	**SS to DIP Transition Restraint -Flanged stainless steel pipe from Wetwell to Valve box restrained joint transition (epoxy coated, SS hardware) Flg x PE RJ.**						
		EBAA Iron Inc	NA	NA	NA	NA	Megaflange 2100	
		Sigma	NA	NA	NA	NA	SigmaFlange with One Lock SLDE	
		Smith Blair	NA	NA	NA	NA	911 Flange - Lock Restrained FCA	
	PVC Pipe MJ Restraints	**Mechanical Joint Wedge-action Restraining Gland, Epoxy Coated Restrain PVC pipe to mechanical joint fittings, and appurtenances.**						
		EBAA Iron Inc	Mega-lug Series 2000PV		Mega-lug Series 2000PV		Mega-lug Series 2000PV	
			NA	NA	NA	NA	Megalug Series 2200	(42"-48")
		Ford / Uni-Flange	UFR 1500 Series		UFR 1500 Series		UFR 1500 Series	
		Sigma	One Lok Series SLC/SLCE		One Lok Series SLC/SLCE		One Lok Series SLC/SLCE	
		Smith Blair	Cam Lok Series 120		Cam Lok Series 120		Cam Lok Series 120	
		Star	Star Grip Series 4000		Star Grip Series 4000		Star Grip Series 4000	
		Tyler Union	TufGrip Series TLP		TufGrip Series TLP		TufGrip Series TLP	
	PVC Bell Joint Restraints (4" - 12") (New & Existing)	**PVC Bell Joint Restraints: PVC pipe Split Serrated on Bell End and Spigot End. (4" - 12") (New & Existing)**						
		EBAA Iron Inc	Tru-Dual Series 1500TD		Tru-Dual Series 1500TD		Tru-Dual Series 1500TD	
		Ford / Uni-Flange	Uni-Flange Series 1390		Uni-Flange Series 1390		Uni-Flange Series 1390	
		Sigma	PV-Lok Series PWP		PV-Lok Series PWP		PV-Lok Series PWP	
		Smith Blair	Bell-Lock Series 165		Bell-Lock Series 165		Bell-Lock Series 165	
		Star	Series 1100C		Series 1100C		Series 1100C	
		Tyler Union	TufGrip 300C		TufGrip 300C		TufGrip 300C	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Joint Restraints	PVC Bell Joint Restraints (16" & Greater)	**PVC Bell Joint Restraints: (16" & Greater) PVC pipe Split Serrated on Bell End and Spigot End. Water & Reclaimed Water Existing pipe only. Wastewater shall be new and existing pipe.**						
		Ford / Uni-Flange	Series 1390	Existing Only	Series 1390	Existing Only	Series 1390	
		JCM	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	Existing Only	Sur-Grip Series 621	
		Sigma	PV-Lok PWP	Existing Only	PV-Lok PWP	Existing Only	PV-Lok PWP	
		Smith Blair	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	Existing Only	Bell-Lock Series 165	
		Star	Series 1100C	Existing Only	Series 1100C	Existing Only	Series 1100C	
Pipe	PVC C900 DR 18 Bell & Spigot (4" - 12")	**C900 Bell & Spigot PVC Pipe: 4 to 12-inch - AWWA C-900, Minimum DR18 for Water, Reclaimed and Wastewater. DR14 for Fire Lines. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 4" to 12"	Certa-Lok C900/RJ	Blue	Certa-Lok C900/RJ	Pantone Purple	Certa-Lok C900/RJ	Green
		Diamond Plastics Corp	C-900	Blue	C-900	Pantone Purple	Diamond C900	Green
		Ipex Inc	C-900 Blue Brute	Blue	C-900	Pantone Purple	C900 Blue Brute	Green
		JM Eagle	C-900	Blue	C-900	Pantone Purple	C-900	Green
		National Pipe & Plastics Inc	C-900 Dura- Blue	Blue	C-900	Pantone Purple	C-900 Pipe	Green
		North American Pipe Corp (NAPCO)	C-900	Blue	C-900	Pantone Purple	C-900	Green
		Sanderson Pipe Corp	C-900	Blue	C-900	Pantone Purple	C-900	Green
	PVC C905 DR 18 Bell & Spigot 16" and Larger	**C905 Bell & Spigot PVC Pipe 16" and Larger: AWWA C-905, Minimum DR18 for all Force Mains up to 24". Minimum DR21/DR25 for 30" and greater. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed 16"	NA	NA	NA	NA	Certa-Lok C905/RJ	NA
		Diamond Plastics Corp	NA	NA	NA	NA	Trans-21 DR18	Green
		Ipex Inc	NA	NA	NA	NA	IPEX Centurion	Green
		JM Eagle	NA	NA	NA	NA	C905 Big Blue	Green
		National Pipe & Plastics Inc	NA	NA	NA	NA	C905	Green
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	C905 Big Blue	Green
	HDPE C906 DR11	**HDPE Pipe DR11 AWWA C906 shall be Ductile Iron Pipe Size, PE 3408/3608/4710 DIPS manufactured in accordance with ASTM F-714 and listed with NSF. Pipe shall be marked in accordance with either AWWA C901,AWWA C906. Compression type connections are not acceptable in new installations. Pipe joints shall be butt fusion or electro-fusion with flange or adapter. All HDPE shall be color coded to the Utility. Color identifications are in accordance with the APWA/ULCC Uniform Color Code. Manufacturers shall be members in good standing with PPI to maintain approval status.**						
		JM Eagle	HDPE	DR11 Blue	HDPE	DR11 Pantone	HDPE	DR11Green
		Performance Pipe(Chevron)	Driscoplex 4000	DR11 Blue	Driscoplex 4000	DR11 Pantone	Driscoplex 4300	DR11 Green
		PolyPipe, Inc.	EHMW Poly Pipe	DR11 Blue	EHMW	DR11 Pantone	EHMW	DR11Green

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pipe	Ductile Iron Pipe	**Ductile iron/Cast iron: (4" to 12" = Class 350, 16" to 24" - Class 250, 30" to 64" = Class 200). Water and Reclaimed water shall be cement lined. Wastewater Piping shall be Protecto 401 and Holiday Free. Exterior coatings as specified. Wastewater DIP piping shall be for pump station piping only. Manufacturers shall be members in good standing with DIPRA to maintain approval status.**						
		American	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		Griffin	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		McWane Inc. DI Pipe Group	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
		US Pipe	Cement Lined	Blue	Cement Lined	Pantone Purple	Protecto 401	Pump Station
Sample	Sample Station	**Sample Stations - Bacteriological Sample Station with built in flush system, all internal piping to be 2", brass and includes lockable green enclosures.**						
		Safety-Guard	SG-BSS-05 pedestal #77	green enclosure	NA	NA	NA	NA
		Water Plus Corp	Model 5000	green	NA	NA	NA	NA
Services	Brass Service Saddles	**Brass Service Saddles for 1" & 2" water & reclaimed water services on 4" through 12" Mains - Service saddles can be hinge or bolt controlled OD saddles to be used on C-900 and existing IPS OD PVC pipe.**						
		Ford	Series S-70, S-90	4"-12"	Series S-70, S-90	4"-12"	NA	NA
		AY McDonald	Model 3891 / 3895,3801 / 3805	4"-12"	Model 3891 / 3895,3801 / 3805	4"-12"	NA	NA
		Mueller	Series S-13000/H-13000	4"-12"	Series S-13000/H-13000	4"-12"	NA	NA
	Service Saddles	**Service Saddles for 1" (CC) & 2" (Iron pipe threads) Water & Reclaimed Water services on mains greater than 12". Service saddles for 2" taps (iron pipe threads) on 4" mains and greater for Waste Water. : Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on C-900 / C905 or DI for all 1-in and -2in taps on pipes over 12in.**						
		Ford	Series FC202	16" & greater	Series FC202	16" & greater	Series FC202	4" & greater
		JCM	Series 406	16" & greater	Series 406	16" & greater	Series 406	4" & greater
		Mueller	DR2S	16" & greater	DR2S	16" & greater	DR2S	4" & greater
		Romac	Series 202NS	16" & greater	Series 202NS	16" & greater	Series 202NS	4" & greater
		Smith Blair	Series 317	16" & greater	Series 317	16" & greater	Series 317	4" & greater
	Service Saddles for HDPE	**Service Saddles for 1" (CC) & 2" (Iron Pipe threads) Water and Reclaimed Water Services: Epoxy or nylon coated stainless steel 18-8-type 304 double straps, controlled O.D. saddles to be used on HDPE for all 1-in and -2in taps. Taps to HDPE pipe shall be approved on a case by case basis.**						
		Ford	Series FCP202		Series FCP202		Series FCP202	
		Romac	Series 202N-H		Series 202N-H		Series 202N-H	
		Smith Blair	Series 317-1 for HDPE		Series 317-1 for HDPE		Series 317-1 for HDPE	
	Corporation Stops Ball Type	**Corporation Stops Ball Type (1-inch with AWWA taper C threads only/pack joint outlet for CTS) 2" Corporation Stop Ball Type shall be 2" MIP X FIP threads.**						
		Ford	FB1000, FB1700-7		FB1000, FB1700-7		FB1700-7	2" ARV
		AY McDonald	4701B-22, 3149B2		4701B-22, 3149B2		3149B2	2" ARV
		Mueller	P25008, B-20046		P25008, B-20046		B-20046	2" ARV

APPENDIX D **LIST OF APPROVED PRODUCTS - TRANSMISSION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Services	Curb Stops	**Curb Stops - Straight Valves: Ball type compression 2" cts O.D. tubing by 2" FIP**						
		Ford	B41-777W		B41-777W		NA	NA
		AY McDonald	6102W-22		6102W-22		NA	NA
		Mueller	P25172		P25172		NA	NA
	Curb Stops	**Curb Stops - Straight Valves: ball type compression x compression**						
		Ford	B44-444W		B44-444W		NA	NA
		AY McDonald	6100W-22		6100W-22		NA	NA
		Mueller	P25146		P25146		NA	NA
	PE tubing	**Polyethylene tubing: AWWA C901. UV protection (SDR-9) 1-inch and 2-inch only. PE 3408 / PE 4710**						
		Charter Plastics	Blue Ice		Lav Ice		NA	NA
		Endot	Endopure Blue		Endocore Lavender		NA	NA
		JM Eagle	Pure-Core		NA	NA	NA	NA
Tapping Sleeves and Valves	Line Stops	**Line Stops**						
		JCM						
		Romac						
		Smith Blair						
	Tapping Sleeves	**Tapping Sleeves: (Mechanical joint for taps on cast iron, ductile iron, PVC & AC pipe, including size on size) with stainless steel nuts and bolts.**						
		American Flow Control	Series 2800		Series 2800		Series 2800	
			Series 1004		Series 1004		Series 1004	
		Clow	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC	Series F-5205	DIP/PVC
			Series F-5207	A/C Pipe	Series F-5207	A/C Pipe	Series F-5207	A/C Pipe
		JCM	Series 414	FBE	Series 414	FBE	Series 414	FBE
		Mueller	Series H-615	DIP/PVC	Series H-615	DIP/PVC	Series H-615	DIP/PVC
			Series H-619	A/C Pipe	Series H-619	A/C Pipe	Series H-619	A/C Pipe
		Smith Blair	Style 623	FBE	Style 623	FBE	Style 623	FBE
	Tapping Valves: 12" and smaller	**Tapping Valves: 12" and smaller - Tapping Valves shall be furnished with an alignment lip and installed in the vertical position for Water and Reclaim Water. Wastewater shall be installed horizontally and abandoned in the open position. Tapping valves shall be resilient seated only and meet the requirements of AWWA C509 or C515**						
		American Flow Control	Series 2500	Alignment Lip	Series 2500	Alignment Lip	Series 2500	Alignment Lip
		Clow	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip	Series F-6114	Alignment Lip
		Mueller	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip	Series T2360 (4"-12")	Alignment Lip

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Tapping Sleeves and Valves	Tapping Valves: 16" and Larger	**Tapping Valves: 16" and Larger - Tapping valves shall be furnished with an alignment lip and be installed in the vertical position for Water and Reclaimed Water. No tapping valve shall be installed horizontally for Water and Reclaim Water unless approved by the engineer. Tapping Valves 16" and larger AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a spur gear actuator unless noted by the engineer. All tapping valves above 24" shall be furnished with NPT pipe plugs for flushing the tracks when valves are installed horizontally. Tapping valves for Wastewater shall be installed horizontally and abandoned in open position.**						
		American Flow Control	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port	Series 2500	Alignment Lip & flushing port
		Clow	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port	Series F-6114	Alignment Lip & flushing port
		Mueller	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port	Series T2361 (14"&up)	Alignment Lip & flushing port
Valves	Butterfly Valve 42" and Above	**Butterfly Valves 42"and above. AWWA C504. Actuators input torques based on 150 psi valve pressure and 16 fps velocity with a maximum input of 80 ft-lb on 2" nuts and shall withstand 250 ft-lbs. Valve seats shall be leak-tight in both directions at 150 psi.**						
		Clow	Style #1450		Style #1450		NA	NA
		Dezurik	BAW		BAW		NA	NA
		Mueller / Pratt	LINSEAL III / Groundhog		LINSEAL III / Groundhog		NA	NA
	Check Valves	**Valves (Check) 4-inch and Larger (8 mil epoxy lined)**						
		American Flow Control	NA		NA		Series 600 or 50 line	
		Clow / M&H / Kennedy	NA		NA		106	
		Mueller	NA		NA		Series 2600	
	Gate Valves 4" - 12"	**Gate Valves 12" and smaller - resilient seated only AWWA C509 or C515. Valve seat shall be leak-tight in both directions at 150 psi.**						
		American Flow Control	Series 2500		Series 2500		NA	NA
		Clow	Series F-6100		Series F-6100		NA	NA
		Mueller	Series A-2360		Series A-2360		NA	NA
	Gate Valves (Vertical) 16" and Up	**Gate Valves 16" and larger (Vertical Installation) AWWA C515 resilient seated only (16" and 24" no gearing required) above 24" shall be installed vertically with a gear actuator unless noted by the engineer. Valve seat shall be leak-tight in both directions at 150 psi.**						
		American Flow Control	Series 2500		Series 2500		NA	NA
		Clow	Series F-6100		Series F-6100			
		Mueller	Series A-2361		Series A-2361		NA	NA

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Valves	Plug Valves	**Plug Valves - Bi-directional, MJ & Flanged (min. 8mil fusion bonded epoxy with stainless steel bolts), gear operator to be sized for rated pressure of the valve. Valves 4"-20" shall be 80% Full Port and valves 24" and greater shall be minimum of 70% full port. Valve shall be factory tested to minimium 100 PSI in both directions.**						
		Clow	NA	NA	NA	NA	F-5412 FLG	4" & up
			NA	NA	NA	NA	F-5413 MJ	4" & up
		Dezurik	NA	NA	NA	NA	Series PEF or PEC	4"& up
		Millikan / Pratt	NA	NA	NA	NA	Eccentric / Ballcentric	4"& up
		Val-Matic	NA	NA	NA	NA	5600 or 5800 (FLG)	4" & up
			NA	NA	NA	NA	5700 or 5900 (MJ)	4" & up
Valve Boxes	Valve Boxes with Locking Lids (Cast Iron)	**Two piece standard screw type Heavy Duty Valve Boxes with Locking Lids (Cast Iron) and type of service cast in heavy duty traffic lid (H20 loading) ASTM A48**						
		Bingham/Taylor	Series 4905	Box	NA	NA	Series 4905	Box
			4905-X	Extension	NA	NA	4905-X	Extension
			4904-L	Blue Water Locking Lid	NA	NA	4904-L	Green Sewer locking Lid
		Sigma	Series VB 261X-267X	Box	VB-25031LK-VB-2612	Box	Series VB 261X-267X	Box
			VB 6302	Extension	VB-6302	Extension	VB 6302	Extension
			VB 4650W	Blue Water Locking Lid	VB2503LK	Purple Square Locking Lid	VB 4650S	Green Sewer locking Lid
		Star	Series VB-0002	Box	NA	NA	Series VB-0002	Box
			VBEX 12-24S	Extension	NA	NA	VBEX 12-24S	Extension
			VBLIDLOCK	Blue Water Locking Lid	NA	NA	VBLIDLOCK	Green Sewer locking Lid
		Tyler Union	Series 6850	Box	NA	NA	Series 6850	Box
			58, 59, 60	Extension	NA	NA	58, 59, 60	Extension
			Locking Lid	Blue Water Locking Lid	NA	NA	Locking Lid	Green Sewer locking Lid
	Valve Box	**For mains equal to, or greater than, 16" diameter or equal to greater than 6' feet deep**						
		American Flow Control	# 2A - 9A Retrofit Valve Box Insert	Fit inside std valve boxes	NA		2A - 9A Retrofit Valve Box Insert	Green Sewer locking Lid
		Mueller Company	MVB050C thru MVB130C with Extension Stem MVB875 Guide Plate	Blue Water Locking Lid	MVB050CR thru MVB130CR with Extension Stem MVB875 Guide Plate	Purple Square Locking Reclaim Lid	MVB050C thru MVB130C with Extension Stem MVB875 Guide Plate	Green Sewer locking Lid

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Coatings	Anti-Graffiti Paint	**Block Walls-Anti-Graffiti Paint per Section 3119 Coatings & Linings**						
		American Building Restoration Products	NA	NA	NA	NA	Polyshield Graffiti Preventer for Unpainted Masonry Type B	Super Bio Strip or Strip it all
		Tnemec / Chemprobe	NA	NA	NA	NA	626 DUR A PEL	680 Mark A Way
		Professional Products of Kansas, Inc	NA	NA	NA	NA	Professional Water Seal & Anti-Graffitiant (PWS-15 Super Strength)	Professional Phase II Cleaner
	Coatings for Existing Manholes	**Rehabilitation corrosion protection system per Section 3119 Coatings & Linings. Interior coating for force main connections to existing concrete manholes only. New precast structures and existing pump stations shall be lined.**						
		CCI Spectrum, Inc	NA	NA	NA	NA	Spectrashield	min of 500 mils
		Kerneos Aluminate Technologies	NA	NA	NA	NA	Sewpercoat	1" (1000mil)
		Raven Lining System	NA	NA	NA	NA	Raven 155 Primer Raven 405	min 8 mils min 125 mils
		Sauereisen	NA	NA	NA	NA	210 Series Topcoat Glaze 210G	min 125 mils min 20 mils
		Tnemec	NA	NA	NA	NA	Series 434 Topcoat Glaze 435	min 125 mils 15-20 mils
PVC Pipe and fittings	Pipe SDR 35 Gravity Mains	**PVC Pipe for Gravity SDR26/SDR 35 (Green in color) ASTM-D034. Manufacturers shall be members in good standing with Uni-Bell to maintain approval status.**						
		Certainteed	NA	NA	NA	NA	Gravity Sewer Pipe	
		Diamond Plastics Corp	NA	NA	NA	NA	Sani-21 SDR-35	
		JM Eagle	NA	NA	NA	NA	Gravity Sewer	
		National Pipe & Plastics, Inc.	NA	NA	NA	NA	Ever-Green Sewer Pipe	
		North American Pipe Corp (NAPCO)	NA	NA	NA	NA	Gravity Sewer	
		Sanderson Pipe Corp	NA	NA	NA	NA	Gravity Sewer	
	Locate Balls	**Locating Marker Systems - Wastewater Locator balls placed at all sanitary sewer cleanouts**						
		3M	NA	NA	NA	NA	3M™ EMS 4" Extended Range 5' Ball Marker 1404-XR	
	Fittings SDR 35	**Fittings, Adapters and Plugs - Gravity PVC ASTM-D3034, Min SDR26/ SDR 35**						
		GPK Products, Inc.	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Harrington Corporation (HARCO)	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Multi Fittings Corp.	NA	NA	NA	NA	SDR26/SDR 35 Trench Tough Sewer Fittings	
		JM Eagle	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		Plastic Trends Inc	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	
		TIGRE USA, Inc.	NA	NA	NA	NA	SDR26/SDR35 Gasketed sewer fittings	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
PVC Pipe a	Flexible Pipe Connectors	**Flexible Pipe Connectors and Transitions**						
		Fernco	NA	NA	NA	NA	1002, 1051, 1056 Series	
		Indiana Seal	NA	NA	NA	NA	102, 151, 156 Series	
		Mission Rubber	NA	NA	NA	NA	MR02, MR51, MR 56 Series	
Precast Concrete Structures	MH Lids	**Frame and Cover**						
		USF Fabrication Inc.	NA	NA	NA	NA	USF 225-AS	
	Adj Ring	**Top Adjusting Rings - HDPE with heavy duty loading (H-20)**						
		Ladtech, Inc	NA	NA	NA	NA	24R, 24S with Rope Sealant CS2455	
	Hatches	**Wet Well and Valve Vault Access Frames and Covers (Include the term "Confined Space" etched or cast into the cover with recessed lock & hasp. Frames and covers per manufacturers specifications.**						
		Halliday Products	NA	NA	NA	NA	S1R or S2R Series	
		USF Fabrication Inc.	NA	NA	NA	NA	APS or APD Series	
	Precast Concrete Structures	**Precast Manhole and Wetwell Structures ASTM C478. Precast concrete shall be batched with concrete dyed crystalline waterproofing admixture with corrosion protection. Concrete without admixture or without color tint /tracer shall be rejected.**						
		Allied Precast	NA	NA	NA	NA	Dyed Admix	
		Atlantic Concrete Products, Inc.	NA	NA	NA	NA	Dyed Admix	
		Delzotto Products, Inc.	NA	NA	NA	NA	Dyed Admix	
		Dura Stress Underground Inc.	NA	NA	NA	NA	Dyed Admix	
		Hanson Pipe & Product	NA	NA	NA	NA	Dyed Admix	
		Mack Concrete	NA	NA	NA	NA	Dyed Admix	
		Oldcastle Precast	NA	NA	NA	NA	Dyed Admix	
		Standard Precast Inc.	NA	NA	NA	NA	Dyed Admix	
	Concrete Admix	**Crystalline Waterproofing Concrete Admix with color dye shall be added to all concrete structures (precast and cast-in-place) to provide waterproofing and corrosion resistance. Concrete without admixture or without color tint / tracer shall be rejected. % concentration of admix with colored dye added to the mix shall be based on weight of cement.**						
		Kryton International	NA	NA	NA	NA	KIM K-301R (with red dye)	2%
		Xypex Chemical Corp	NA	NA	NA	NA	Xypex Admix C-1000Red (with red dye)	3.0 - 3.5%
	Liners	**Interior Liner for New or existing Precast Manhole and Precast Wetwell Structures per Section 3119 Coatings & Linings**						
		AFE	NA	NA	NA	NA	Fiberglass Liner	
		AGRU Liner	NA	NA	NA	NA	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		Containment Solutions Inc. (Flowtite)	NA	NA	NA	NA	Fiberglass Liner	
		GSE Studliner	NA	NA	NA	NA	HDPE Liner (Min 2 mm for Manhole / Min 5 mm for Pump Station)	
		GU Liner	NA	NA	NA	NA	Reinforced Plastic Liner	
		L & F Manufacturing	NA	NA	NA	NA	Fiberglass Liner	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Precast Concrete Structures	Heat Shrink Seal	**Heat Shrink Seal - Precast structures shall be primed with manufacturer approved primer prior to application of heat shrunk encapsulation.**						
		Canusa-CPS	NA	NA	NA	NA	Wrapid Seal with WrapidSeal Primer (Canusa G Primer)	
		Pipeline Seal & Insulator, Inc (PSI)	NA	NA	NA	NA	Riser Wrap with Polyken 1027 or 1039 primer	
	Jointing Material	**Jointing Material Min. 2" width for all products to ensure squeeze out with manufacturer approved primer.**						
		Henry Company	NA	NA	NA	NA	Ram-Nek	with Primer
		Martin Asphalt Company	NA	NA	NA	NA	Evergrip 990	with Primer
		Trelleborg Pipe Seals	NA	NA	NA	NA	NPC – Bidco C-56	with Primer
	Pipe Seals Gravity	**Resilient Connector Pipe Seals, Manhole - Gravity less than 12-inch and less than 15-ft deep**						
		Atlantic Concrete	NA	NA	NA	NA	A-Lok (cast-in-place)	
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal (cast-in-place)	
		IPS	NA	NA	NA	NA	Wedge Style	
		NPC	NA	NA	NA	NA	Kor-N-Seal Model WS	
		Press seal gasket	NA	NA	NA	NA	PSX Direct Drive	
	Pipe Seals Gravity	**Cast in Place Pipe Seals, Manhole - Gravity Greater Than or Equal to 12-inch and all pipe sizes greater than 15-ft deep**						
		Atlantic Concrete	NA	NA	NA	NA	A-Lok	cast in place
		Hail Mary Rubber	NA	NA	NA	NA	Star Seal	cast in place
	FM Pipe Seals	**Modular Pipe Seals for Wet Well and Valve Box penetrations and all forcemain connections to existing and new precast concrete structures. EPDM Rubber with 316 SS Hardware**						
		CCI Pipeline Systems	NA	NA	NA	NA	Wrap-It Link WL-SS Series	
		Pipeline Seal & Insulator, Inc / Link Seal	NA	NA	NA	NA	Link-Seal S-316 Modular Seal	
		Proco Products, Inc	NA	NA	NA	NA	PenSeal ES-PS Series	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Generator	Gen	**Generator Systems, Fixed Shall be UL 2200 Certified.**						
		Caterpillar	NA	NA	NA	NA	CAT Diesel Generator Set	
		Cummins Power Generation	NA	NA	NA	NA	Diesel Generator Set	
	Fuel Tanks	**Generator Fuel Tanks. Shall be UL2085 certified.**						
		Convault	NA	NA	NA	NA	CVT-3SF or CVT-3FF	
		Phoenix	NA	NA	NA	NA	Envirovault	
	GR	**Generator Receptacle (GR)**						
		Cooper Crouse-Hinds	NA	NA	NA	NA	AR2042 (230V, 200A, 3P, 4W)	With AJA1 Angle Adaptor
		Cooper Crouse-Hinds	NA	NA	NA	NA	AR2042-S22 (460V, 200A, 3P, 4W)	With AJA1 Angle Adaptor
		Pyle National	NA	NA	NA	NA	JRE-4100 (230V, 100A, 3P, 4W)	
	ATS	**Generator Transfer Switch**						
		Russelectric	NA	NA	NA	NA	RMTD Series with model 2000 controller	NEMA 12/3R 316SS Enclosure
Odor Control Units	Biotrickling Filters	**Biotrickling filters**						
		BioAir	NA	NA	NA	NA		
		Biorem	NA	NA	NA	NA	Biosorbens BTF	
		Envirogen	NA	NA	NA	NA	BTF	
		Siemens	NA	NA	NA	NA	Zabocs BTF	
	Carbon Adsorption Units	**Carbon Adsorption Units**						
		Calgon	NA	NA	NA	NA		
		Pure Air Filtration	NA	NA	NA	NA		
		Siemens	NA	NA	NA	NA		
Pressure Gauges	Pressure Gauges	**Pressure Gauges shall have Diaphragm Seals. Oil filled.**						
		Ashcroft	NA	NA	NA	NA	10 1008SL 02L 60# 25 200SS 02T XYTSE	Gauge Diaphragm Seal
		Trerice	NA	NA	NA	NA	D83LFSS4002LA100 - Gauge M51001SSSS - Diaphragm Seal D99100 Fill and Mount Charge	
		Winter Gauges	NA	NA	NA	NA	PFQ770 0-60 PSI D70950 top D70954 Bottom	
Pumps	Pumps	**Submersible Pumps**						
		ABS	NA	NA	NA	NA		
		Flygt	NA	NA	NA	NA		

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pumps	Floats	**Float Regulator (FR) - Duplex and Triplex Pump Stations**						
		Atlantic Scientific	NA	NA	NA	NA		Roto-Float
	Radar	**Radar - Pulse Burst Radar Transmitter. Input 24 VDC and Output 4-20 mA**						
		Magnetrol	NA	NA	NA	NA		R82-520A-011
Pump Station Main Ser	Main Srvc Disconne	**Main Service Disconnect Breaker**						
		Square D	NA	NA	NA	NA		H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)
	Surge Protector Device	**Surge Protector - UL 1449, 3rd Edition listed and labeled, minimum 10 year warranty, NEMA LS-1 and IEEEC62, 41/45 tested with NEMA 4X enclosure, internal fusing, voltage and phase to match service. Rated 80,000 amps per mode for Duplex & Triplex stations and 150,000 Amperes per mode for Master Stations. All devices shall be provided with a NEMA 4X Plastic enclosure which is approved in lieu of stainless steel.**						
		Current Technology (Power & Systems	NA	NA	NA	NA		XN-80, TG-150 or CurrentGuard 150 Plus Series
		Josyln AKA (Total Protection Solutions)	NA	NA	NA	NA		TSS-ST 160 Series, ST 300 Series or JSP-300 Series
		Surge Suppressors, Inc	NA	NA	NA	NA		LSE Series or SHL Series
Sub Panel	Sub Panel	**Sub-Panel Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated-finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
Pump Station Control Panel	Control Panel	**Control Panel Supplier**						
		ECS	NA	NA	NA	NA		
		Sta-Con Inc	NA	NA	NA	NA		
	Enclosure	**Enclosure - NEMA 12/3R Enclosure 316SS, white polyester Powder coated finish inside and out, With 3 Point Pad lockable Handle, and Door Stop**						
		Hoffman	NA	NA	NA	NA		
		Schaefer	NA	NA	NA	NA		
		Universal enclosure systems	NA	NA	NA	NA		
	Mnts	**Mounting Channel for Enclosures**						
		Unistrut Stainless Steel	NA	NA	NA	NA		1" 5/8 x 1" 5/8 316 SS
	Seal-off	**Explosion-Proof Sealoff**						
		Cooper Crouse-Hinds	NA	NA	NA	NA		EYSR - 2 Inch Min.
	FL	**Flasher (FL)**						
		MPE	NA	NA	NA	NA		025-120-105
		SSAC	NA	NA	NA	NA		FS-126

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	AL	**Alarm Light / With Base and Globe (AL)**						
		American Electric	NA	NA	NA	NA	F32552	
		Red Dot Globe Red Dot Base	NA	NA	NA	NA	VGLR-01 VA-01	
	AH	**Alarm Horn (AH)**						
		Wheelock	NA	NA	NA	NA	3IT-115-R	
	Fuse	**Fuses (F)**						
		Bussmann	NA	NA	NA	NA	FNQ-R or KTK-R	
	HOA	**Hand-Auto-Off Selector (HOA)**						
		Square D	NA	NA	NA	NA	9001-SKS43B	
	HSS	**Horn Silence Button (HSS)**						
		Square D	NA	NA	NA	NA	9001-SKR1RH5	
	Inter-lock	**Mechanical Interlock**						
		Square D	NA	NA	NA	NA	S29354	
	Breakers	**Control Panel Main Circuit Breaker (MCB) With S29450 Circuit Breaker Auxiliary Switch**						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Emergency Circuit Breaker (ECB) With S29450 Circuit Breaker Auxiliary Switch						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Motor Circuit Breaker (MB)						
		Square D	NA	NA	NA	NA	H or J Frame 3 Pole 600 Volt (HGL or JGL determined by amperage)	
		Control Circuit Breaker/ GFCI Receptacle Breaker/ SCADA Breaker						
		Square D	NA	NA	NA	NA	QOU120	
	MS	**Motor Starter (MS)**						
		Square D	NA	NA	NA	NA	Type S Class 8536	
	OL	**Overload Heater(OL)**						
		Square D	NA	NA	NA	NA	Part number will vary with size needed	
	OR	**Overload Reset**						
		Square D	NA	NA	NA	NA	9066-RA1	
	Transformer	**Control Circuit Transformer (XMFR)**						
		Square D	NA	NA	NA	NA	9070TF75D23	120/24 Volt .075 KVA
		Main Circuit Transformer (MCT)						
		Square D	NA	NA	NA	NA	9070T2000D1	480/120 2KVA
	SPB	**Supplemental Protector Breaker - 3 pole, 1-amp for Phase Monitor**						
		Square D	NA	NA	NA	NA	MG24532	

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	PM	**Phase Monitor (PM)**						
		MPE 240 V.	NA	NA	NA	NA	001-230-118-OVG5	
		MPE 480 V.	NA	NA	NA	NA	002-480-123-OVG5	
	Pump Alternator	**Pump Automatic Alternator (PAA)**						
		Diversified Duplex	NA	NA	NA	NA	ARA-120-ACA	
		Diversified Triplex	NA	NA	NA	NA	ARA-120-AME	
		MPE Duplex	NA	NA	NA	NA	008-120-13SP	
		MPE Triplex	NA	NA	NA	NA	009-120-23P	
		MPE Triplex Socket	NA	NA	NA	NA	SD-12-PC	
	Alt. Test Switch	**Alt. Test Switch**						
		Carling Technologies	NA	NA	NA	NA	6GG5E-78	
		Honeywell	NA	NA	NA	NA	2TL1-50	
	Relay	**Relay**						
		Potter Brumfield 24 Volt	NA	NA	NA	NA	KRPA-11AN-24	
		Potter Brumfield 120 Volt	NA	NA	NA	NA	KRPA-11AN-120	
		Square D 24 Volt	NA	NA	NA	NA	8501KP12P14V14	
		Square D 120Volt	NA	NA	NA	NA	8501KP12P14V20	
	Relay Base	**Relay Base**						
		IEDC 8 Pin Relay Base 600 Volt	NA	NA	NA	NA	SR2P-06	
	Duplex Receptacle / GFCI	**Duplex Receptacle/GFCI (DR) Upgraded to 20 Amp**						
		Hubbell	NA	NA	NA	NA	GFTR20BK	
		Pass & Seymour	NA	NA	NA	NA	2095TRBK	
	ETM	**Elapse Time Meter (ETM)**						
		Reddington	NA	NA	NA	NA	711-0160	
	Grounding	**Grounding System**						
		Marathon	NA	NA	NA	NA	Neutral Isolation Block 1421570	
		Panduit	NA	NA	NA	NA	Ground Lug LAM2A 1/0 - 014 -6Y	
		Square D	NA	NA	NA	NA	Ground Buss PK7GTA	
	TS	**Terminal Strip (TS)**						
		Marathon	NA	NA	NA	NA	Series 200	
		Square D	NA	NA	NA	NA	9080GR6	
	TS	**Terminal Strip End Blocks and End Clamps**						
		Square D	NA	NA	NA	NA	9080GM6B & 9080GH10	

APPENDIX D **LIST OF APPROVED PRODUCTS - PUMP STATION SYSTEMS** **FEBRUARY 11, 2011**

Cat.	Desc	Manufacturer	Water Model #	Water Comments	Reclaimed Water Model #	Reclaimed Water Comments	Wastewater Model #	Wastewater Comments
Pump Station Control Panel	PL	**Pilot Light (PL) 24 Volt with 1819 Bulb**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelight 930507X	
	RL	**Run Indicator Light (RL) 120 Volt**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelites 930507X With 120MB Bulb	
	MT	**Moisture and Temperature Failure Light (MT) 120 Volt with 120MB Bulb**						
		Dialight	NA	NA	NA	NA	803-1710	
		Lighting Components & Design	NA	NA	NA	NA	Littlelites 930507X	
Sluice	Sluice Gate	**Sluice Gate for Wet Well with Motorized Operator**						
		BNW	NA	NA	NA	NA	Model 77 - 316 SS	
		Fontaine	NA	NA	NA	NA	Model 20 - 316 SS	
VFD	VFD	**Variable Frequency Drives**						
		Square D	NA	NA	NA	NA		