

City of
Melbourne
The Harbor City



Technical Specifications and Standards for Construction of Water Distribution Systems

Technical Specifications and Standards for Construction of Reclaimed Water
Distribution Systems

Technical Specifications and Standards for Construction of Wastewater Collection Systems

Appendix A: Technical Specification Detail Drawings

Appendix B: Approved Products List

Approved: _____

Ralph E. Reigelsperger
Ralph Reigelsperger, P.E., Public Works and Utilities Director

Date: 6-29-16

Approved: _____

Jenni Lamb
Jenni Lamb, P.E., City Engineer

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City of
Melbourne
On Florida's SpaceCoast



Technical Specifications and Standards for Reclaimed Water Distribution Systems

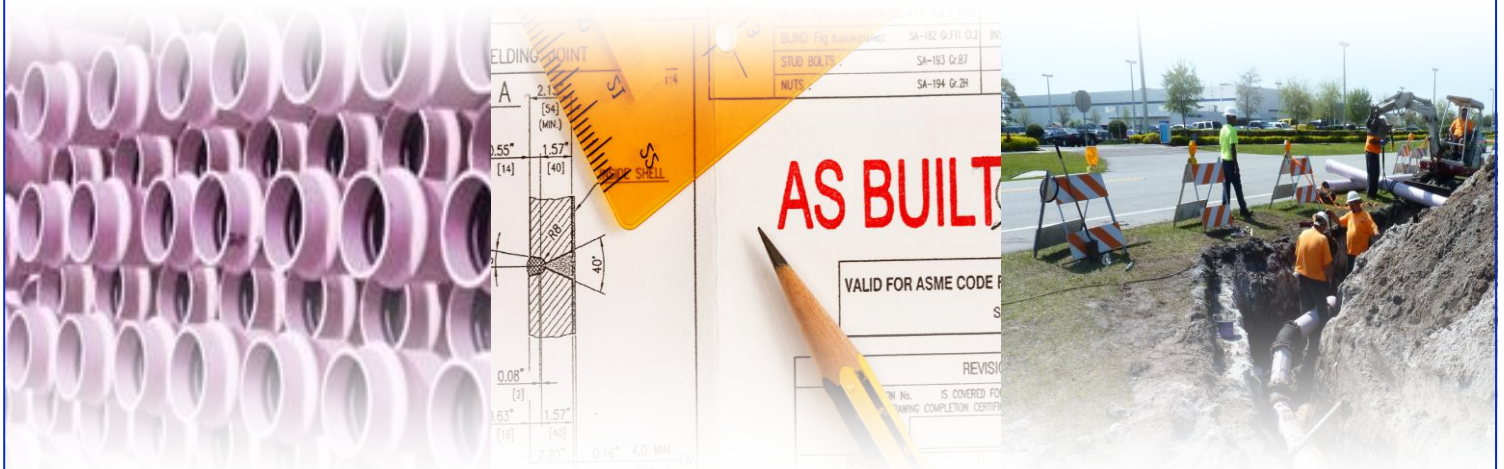




TABLE OF CONTENTS

R1000	General Information	4
R1001	Licenses	4
R1002	Contractor Scope of Work	4
R1100	Plan Specifications and Submittals	5
R1200	Technical Design Criteria	6
R1201	Design Criteria	6
R1202	Average Daily Flow and Peak Flow	6
R1203	Reclaimed Water Main Location	7
R1204	Utility Separation	7
R1205	Pressure and Friction Loss	8
R1206	Diameter	8
R1207	Depth of Cover	9
R1208	Pressure and Restraint	9
R1209	Velocity	9
R1210	Dead Ends	9
R1211	Valve Location	9
R1212	Valves	10
R1213	Air Valves	10
R1214	Pressure Control Valves	10
R1215	Services	10
R1216	Meters	10
R1217	Meter Location	11
R1218	Pipe Material	11
R1219	Customer Control Valve	11
R1220	Aerial Crossings	11
R1221	System Identification and Color Coding	12
R1222	Signage	13
R1223	Reclaimed Water Hose Bibs	13
R1224	Major Users of Reclaimed Water	13
R1300	Material Specifications	14
R1301	Pipe	15
R1302	Valves and Valve Boxes	16
R1303	Fittings	17
R1304	Tapping Sleeves and Valves	18
R1305	Service Connections	19
R1306	Inspection of Materials	20
R1400	Construction	20
R1401	Protection	20
R1402	Notification	20
R1403	Obstructions	20
R1404	Trench Preparation	21
R1405	Pipe Line Construction	22
R1406	Backfilling	23
R1407	Valves and Fittings	25
R1408	Mechanically Restrained Fittings	26
R1409	Pipe Installed in Casing	26
R1410	Blow Offs	27



TABLE OF CONTENTS

<u>R1500</u>	<u>Horizontal Directional Drill</u>	27
R1501	General	27
R1502	Experience	27
R1503	Warranty	28
R1504	Jurisdiction of Work	28
R1505	Referenced Standards	28
R1506	Submittals	29
R1507	Permits	30
R1508	Quality Assurance	30
R1509	Execution	31
R1510	Excavation	31
R1511	Drilling Operations	31
R1512	Reaming and Pulling	33
R1513	HDD Material	34
R1514	HDD Pressure Testing	36
R1515	Pipe Abandonment	36
R1516	Restoration of Paved, Improved and Unimproved Areas	36
R1517	Final Submittals	37
<u>R1600</u>	<u>Cleaning, Flushing and Testing</u>	37
R1601	Filling	37
R1602	Cleaning and Flushing	37
R1603	Testing	38
<u>R1700</u>	<u>Connection to Existing System</u>	39
R1701	Service Installations	39
R1702	Testing Connections to Existing System	42
R1703	Meters	42
<u>R1800</u>	<u>Cross-Connection Control</u>	43
<u>R1900</u>	<u>Initiation of Reclaimed Water Service</u>	43
<u>R2000</u>	<u>Final Clean Up</u>	44
<u>R2100</u>	<u>As-Built Survey and Record Drawings</u>	44
<u>R2200</u>	<u>Requirements for Scheduling Pre-Final Inspection</u>	45
<u>R2300</u>	<u>Maintenance Bond</u>	46
<u>Appendix A- Technical Details</u>		
<u>Appendix B- Approved Products List</u>		



R1000 GENERAL INFORMATION

These specifications and standards cover the design, drawings, specifications, installation, inspection, testing and acceptance of reclaimed water distribution systems, reclaimed water transmission main extensions, and all appurtenant items which are to be owned and maintained by the City of Melbourne (reference herein as the City). This includes developer-built on-site reclaimed water distribution systems in residential subdivisions and commercial developments, off-site transmission main extensions to development sites, and on-site requirements for all reclaimed water users.

Reclaimed water shall be utilized, when available, for irrigation and other approved uses that do not require potable water. Use of reclaimed water and the construction of reclaimed water distribution systems shall be in accordance with the most current edition of Chapter 62-610, Reuse of Reclaimed Water and Land Application, Florida Administrative Code (F.A.C.), City of Melbourne Code of Ordinances, Florida Department of Environmental Protection (FDEP) Water Reclamation Facility Operating Permits, City of Melbourne Cross-Connection Control Manual and City Technical Specifications and Standards for Reclaimed Water Distribution Systems, Latest Edition (referenced herein as technical specifications). In case of conflict, Chapter 62-610 F.A.C. shall prevail.

If improvements are being made under the jurisdiction of another governmental entity and the requirements differ, the more stringent shall apply.

All referenced industry specifications and standards are to be latest revision.

Based on the reclaimed water ordinances and sufficient availability of the resource, the City will evaluate all development projects to determine if the use of reclaimed water is appropriate.

R1001 LICENSES

All Contractors must have one of the following current and valid licenses:

- State of Florida Certified Utility Underground Contractor License.
- State of Florida Registered Utility Underground Contractor License.

R1002 CONTRACTOR SCOPE OF WORK

The Contractor shall install all Public and Private reclaimed water mains and appurtenances in accordance with these technical specifications. Any deviation from these technical specifications must be approved in writing by the City prior to commencement of construction of facility affected.

The Contractor shall furnish all labor, materials, tools and equipment necessary or incidental to the construction. The Contractor shall obtain and pay all permits, official inspections by the City and other official fees in connection with the work.

The Contractor shall attend a preconstruction conference and receive a notice to proceed for capital improvement projects or approved construction plans for development projects from the City Engineering Department.



The Contractor shall not remove any thrust blocks or mechanical joints, connect to any reclaimed water main or service line, or operate reclaimed water control valves, except under direct supervision of a representative from the City.

The Contractor shall not backfill any fitting, thrust block, restrainer gland, valve, hydrant assembly and/or meter/backflow assembly until such appurtenances have been inspected in place by a designated representative of the City. All such inspections shall be scheduled a minimum of two (2) working days in advance.

Upon completion of construction, the property owner shall properly maintain and operate privately owned systems and appurtenances in accordance with all applicable codes and regulations.

All referenced AWWA specifications are to be latest revision.

R1100 PLAN SPECIFICATIONS AND SUBMITTALS

The Engineer of Record shall submit signed, sealed and dated design drawings for all reclaimed water distribution projects. The drawings shall include the following:

- Calculations showing the reclaimed water mains having sufficient hydraulic capacity to transport peak hourly flows and average daily flow while meeting the requirements of Section R1205 (Pressure and Friction Loss). Head losses through meters and backflow devices shall also be included in calculations.
- All property corners and control structures shall be designed with state plane coordinates. The following coordinate system shall be used: NAD 1983 HARN State Plane Florida East FIPS 0901. State Plane Coordinates shall be labeled and shown on a minimum of four (4) reference, right-of-way or property corner monuments shown on the Construction Plans that remain in their original condition after construction has been completed.
- Elevations based on NGVD 1929 or NAVD 1988. Control datum consistency shall be maintained throughout drawing submittals.
- Certification stating the basis of horizontal and vertical control.
- Reclaimed water supply source main location, size, material, lengths, class and pressure ratings.
- Location of all mains within ten (10) feet of all buildings and structures including wall, fences, etc.
- All easements, property lines, right-of-ways, and structures. Location of mains from property or easement lines at fifty (50) foot intervals.
- All reclaimed water service connections, type and size of connections, and required meter size.
- All backflow prevention devices.
- All valves, including in-line valves, service valves, and air release valves.
- Pertinent irrigation information, including: size of irrigation main line, irrigable acreage per parcel and total project irrigable acreage, peak demand in GPM.



- Separation between reclaimed water mains and other utilities, including stormwater piping, if they exist within ten (10) feet of reclaimed water mains.
- Show a profile of all conflicts between the reclaimed water lines and other water utilities, including potable water, sanitary sewer and stormwater piping.
- Statement: “All reclaimed water system construction shall be in accordance with the City of Melbourne Technical Specifications and Standards for Reclaimed Water Distribution Systems and the Cross-Connection Control Manual”, Latest Editions.
- Statement: “All reclaimed water irrigation system piping, fixtures and devices shall be color coded purple. The purple color shall be added as a pigment to the material at the time of manufacture. All reclaimed water valve boxes, meter boxes or similar device box covers shall be labeled “Reclaimed Water” and color coded purple.”
- Service lines sized in one-half ($\frac{1}{2}$) inch increments or three (3) inch shall not be permitted. One (1) inch services shall be constructed of copper or high density polyethylene tubing and two (2) inch shall only be constructed of copper, high density polyethylene tubing, or brass.
- Contractor is to verify the location of all existing utilities including depth and material prior to commencement of construction.
- Any existing service lines that need to be removed or relocated must be cut/capped at the corporation stop at the main and a new service line shall be installed.

R1200 TECHNICAL DESIGN CRITERIA

R1201 DESIGN CRITERIA

The reclaimed water system shall be designed to promote efficient reclaimed water usage. Reclaimed water mains shall be designed for the estimated irrigation demand, based on planned development build-out. All reclaimed water mains shall be designed and installed to the furthest point of the proposed project. When a distribution main will serve existing or future developments beyond the borders of the proposed site, the City may request over sizing.

R1202 AVERAGE DAILY FLOW AND PEAK FLOWS

The reclaimed water demand shall be based on one (1) inch of water per irrigated area per week with a peaking factor of 3.2 (University of Florida Cooperative Extension Program recommendations).

Irrigation zones shall be provided to uniformly distribute flows so that the maximum peak hourly factor is not exceeded. Alternate irrigation system designs will be evaluated on a case-by-case basis.



R1203 RECLAIMED WATER MAIN LOCATION

Reclaimed water mains shall be located in dedicated rights-of-way or utility easements. When installed in rights-of-way, reclaimed water mains shall maintain a consistent alignment with respect to the centerline of the road. Mains shall be installed along one side of the road, with crossing kept to a minimum. Wherever practical, reclaimed water mains should be installed on the opposite side of the street from potable water mains and installed in the grass area between the sidewalk and the pavement.

Utility easements shall be consistent with City's Subdivision Code, Section 8.6(c). A minimum twenty (20) foot wide utility easement shall be provided if it is not adjacent to the road right-of-way for piping 6 inches or greater in diameter. Piping, within an easement, shall be located within the centerline of the easement. Structures or other obstructions not pertaining to public utilities or public sidewalks shall not be located in any utility easements; provided that fences or walls may be installed consistent with the Subdivision Code, Section 9.47(d).

If a reclaimed water main is located adjacent to a road right-of-way, a minimum ten (10) foot easement shall be provided and shall be positioned such that there is a minimum of five (5) feet from center line of pipe to edge of easement, opposite road right-of-way.

At the City's discretion, additional easement widths and/or reclaimed water main/structure separation shall be provided when the pipe size, depth of cover or separation requirements so dictates.

Reclaimed water mains shall not be placed under trees, buildings, retention ponds, tennis courts, swimming pools, parking lots or other structures, unless approved by the City. Large hardwood trees, privacy walls, foundations and permanent structures shall not be placed over mains. Placement of mains under pavement shall be kept to a minimum. Any deviation from these technical specifications must have prior City approval and Owner/Developer must enter into a Hold Harmless Agreement with the City.

In general, reclaimed water mains shall not be located along side or rear lot lines or stormwater retention pond berms. Placement of a reclaimed water main along side or rear lot lines or stormwater retention berms may be allowed on a case-by-case basis if such a main configuration results in efficient placement and utilization of the reclaimed water main network, as determined by the City.

Signage will be required to identify reclaimed water mains located underneath ditch crossing or other structures where heavy maintenance equipment is used in or near such structures. See Technical Detail A-108.

In such cases where minimum cover cannot be maintained and/or placement of main so dictates, the City may require the use of restrained-joint ductile iron pipe and/or concrete cover for additional protection of reclaimed water main.

R1204 UTILITY SEPARATION

Separation of potable water, reclaimed water, wastewater collection and stormwater systems shall comply with FDEP regulations outlined in 62-555.314, 62-604 and 62-610 F.A.C. Variances from the FDEP requirements must be approved individually by both FDEP and the City of Melbourne. See Technical Detail A-103 and A-104.



Reclaimed water piping shall be independent of all potable water, sanitary sewer, secondary effluent, and stormwater systems and shall not pass through or come into contact with any part of a sanitary sewer manhole or stormwater manhole or inlet structure.

Reclaimed water mains and service lines shall be installed above gravity sanitary sewer, force mains and stormwater piping and below potable water mains. Where reclaimed water main crosses over other utilities a minimum of twenty (20) inches of cover from top of finish grade shall be maintained. In such cases of Pressure Class 200 (or greater), ductile iron pipe is to be used on those portions of reclaimed water main with less than thirty (30) inches of cover from top of finish grade. The City may require concrete cover for additional protection of reclaimed water main.

Where reclaimed water main must go under potable water, gravity sanitary sewer, force mains and stormwater piping in order to maintain minimum separation requirements, mechanically restrained fittings shall be utilized as per Technical Detail A-105. Omission of fittings by deflection of reclaimed water main will not be acceptable.

In cases where the reclaimed water main crosses under a stormwater pipe with less than eighteen (18) inches of vertical separation, the stormwater piping shall be supported by concrete saddle per Technical Detail A-106.

In addition, drainage pipe joints within twenty (20) feet of reclaimed water main are to be wrapped in a soil tight filter fabric. The crossing shall be arranged so that the reclaimed water joints will be equidistant and as far as possible from center of crossing.

R1205 PRESSURE AND FRICTION LOSS

All reclaimed water mains shall be designed to maintain a minimum pressure of fifty (50) psi at all points of service. Pressure reducing devices are recommended at connection to the City's reclaimed water meter as system pressures operate in the range from fifty (50) psi to ninety (90) psi.

For pressures greater than fifty (50) psi required during typical peak demand hours, special provisions may be required.

Friction losses through water mains shall be based on the Hazen and Williams formula. In the use of Hazen Williams formula, the value for "C" shall be one hundred twenty (120) for ductile iron pipe, one hundred thirty (130) for PVC pipe and one hundred fifty (150) for HDPE. "C" values greater than one hundred fifty (150) shall not be allowed.

R1206 DIAMETER

Only 6, 8, 10, 12, 16, 18, 20, 24, 30, 36, 42, 48, and 54 inch diameter reclaimed water mains shall be permitted. Four (4) inch water mains shall be permitted only in cul-de-sac areas with a maximum length of five hundred (500) feet of pipe. As a minimum, six (6) inch systems shall be required in low-density residential projects. In commercial, industrial, and high-density residential areas, minimum eight (8) inch mains shall be required unless detailed calculations are submitted to substantiate the sufficiency of a six (6) inch main.

For all systems containing mains less than eight (8) inches in nominal diameter, a complete hydraulic analysis of the system shall be provided to assure that the system,



and all elements thereof that supply adequate flows and pressures without exceeding the prescribed velocity, shall be submitted to the City in an acceptable format.

R1207 DEPTH OF COVER

Pipe will be installed with thirty (30) inches of minimum cover. A maximum cover of forty-two (42) inches will be accepted. Cover depth will be determined from finished grade at location of reclaimed water main, as indicated on the plans. The ground cannot be mounded to obtain proper cover.

Exception to stated depth requirement will be those portions of reclaimed water main directional drilled, installed within casings or those portions that go over or under storm drains and structures, sanitary sewers or other utilities as shown on plans. In all such cases, reclaimed water main shall be immediately brought back to proper grade by way of mechanically restrained mechanical joint fittings. The City may require use of concrete cover where minimum depth cannot be obtained. See Technical Detail A-105.

R1208 PRESSURE AND RESTRAINT

The transmission/distribution mains and fittings, including all restrained joint fittings shall be designed to withstand combined pump operating pressures and pressure surges, of not less than one hundred fifty (150) psi.

Restrained joints shall be provided at all changes in direction, valves, and size changes of all mains. Restrained joint pipe shall be required, in conjunction with all conflict crossings, and in other situations that the City deems necessary. The use of thrust blocking as an alternate or additional means of restraint will be evaluated on a case-by-case basis and installed where required as determined by the City.

The restrained joint lengths shall be calculated consistent with the table format shown in the Technical Details A-111. Where internal restrained joints are used, the entire bell shall be painted red with high quality enamel paint.

R1209 VELOCITY

The maximum velocity at design flow rates should not exceed eight (8) feet per second for ductile iron pipe and five (5) feet per second for PVC pipe.

R1210 DEAD ENDS

Where dead-end mains occur, they shall be provided with a blow off assembly for flushing purposes. Blow offs shall not terminate in driveways, sidewalks or any paved surface.

R1211 VALVE LOCATION

Sufficient valves shall be provided on reclaimed water mains to provide ease of operation, maintenance and isolation. Valves shall be located at not more than five hundred (500) foot intervals in commercial and industrial areas and at not more than one thousand (1000) foot intervals in residential and all other areas. Appropriate valving shall also be provided at all areas where reclaimed water mains intersect to ensure effective isolation of reclaimed water lines for repair, maintenance or future



extension. Valves shall be placed on either side of a canal crossing and on each side of a major road crossing (as determined by the City). The City may require additional valving during construction plan review process.

R1212 VALVES

Valves installed on mains thirty (30) inches and larger shall be butterfly valve. Resilient seat gate valves shall be used on mains twenty-four (24) inches and smaller. The City shall have the final determination on type of valve to be used.

R1213 AIR VALVES

Air valves may be necessary to properly manage the accumulation of air in the distribution system. A determination shall be made during the plan review process for the need for air valves, proper valve selection, the location and appropriate installation of such valves.

R1214 PRESSURE CONTROL VALVES

Pressure reducing valves shall not be required but are highly recommended where pressure requirements vary from main line pressures. Engineer of Record shall be responsible for incorporating pressure reducing valves into the project design to protect from high downstream pressures where necessary. Pressure reducing valves are to be installed on the downstream side of the meter.

Pressure sustaining valves will be required where demands from new development would negatively impact upstream system pressures.

R1215 SERVICES

Service lines sized in one-half (1/2) inch increments or three (3) inch shall not be permitted. Double reclaimed water services shall be utilized whenever practical and shall be located at alternating lot lines. All reclaimed water services shall be located at opposite lot corner from potable water services. Reclaimed water service lines shall terminate in such a way that properly allows each curb stop to lay horizontally on the appropriate side of respective lot line midway between curb and sidewalk. Any exception to this location must have prior approval by the City. Separation requirements as outlined in 62-610 F.A.C. apply to service lines installed in City right-of-ways.

Once utilities are constructed in accordance with approved construction plans, any relocation necessary due to conflict with sidewalks or driveways or per owner request shall be at the Contractor's expense.

R1216 METERS

During the plan review process, the City will establish the type of meter to be used on all service lines, and will assist the design Engineer in establishing the meter size best suited for the proposed improvements. The City will furnish all reclaimed water meters up to and including two (2) inch. All meters larger than two (2) inch shall be furnished by the Contractor and shall be an A.M.R. type meter and be in accordance with Appendix B- Approved Products List. Reclaimed water meters three (3) inch and larger



shall be installed above-ground. Meters two (2) inch and smaller shall be installed below-grade. Plate strainers shall be installed on all 'turbo' style meters.

All reclaimed water service connections off of the public main shall be metered.

Commercial, industrial, shopping centers, apartment and condominium projects in general shall require installation of one (1) meter to service the entire development. In general, shopping centers and associated out-parcels shall require installation of a single meter to service the entire development unless out-parcels are adjacent to public right-of-way or otherwise approved by the City.

Unless specifically approved by the City, meters and meter boxes shall not be installed in sidewalks, driveways or areas subject to vehicular traffic. A five (5) foot minimum height and two (2) foot minimum width setback is required between the meter box or meter assembly pad and any landscaping. Landscaping dimensions at full growth shall be considered.

R1217 METER LOCATION

All meters shall be installed in the public right-of-way or in a dedicated utility easement adjacent to public right-of-way that is accessible to the City vehicles and equipment.

R1218 PIPE MATERIAL

The standard pipe material used in the construction of reclaimed water distribution mains includes Ductile Iron, PVC and High Density Polyethylene Pipe. Use of non-standard piping material shall have prior City approval.

R1219 CUSTOMER CONTROL VALVE

Except for individual connections to residential units, a master shut-off valve shall be installed immediately downstream of meter assembly. Master shut-off valve will remain part of Owner's reclaimed water system.

R1220 AERIAL CROSSINGS

It shall be the responsibility of the Engineer of Record to obtain all applicable regulatory permits. When the aerial crossing is accomplished by attachment to a bridge or drainage structure, the Engineer of Record shall meet all requirements of the agencies that own or have jurisdiction over such structures.

Adequate support and anchoring shall be provided for pipes utilized for aerial crossings. Pilings and anchoring are to be designed by an appropriately qualified engineer. Signed and sealed calculations and design data are to be submitted by the Engineer for approval.

Flexible joints shall be designed by the Engineer to address expansion and contraction of the pipe. Flexible joints shall be provided between the aerial and buried sections of the pipe. Calculations and design data are to be submitted by the design Engineer for approval.

For aerial stream crossings, the impact of floodwaters and debris shall be considered. The bottom of the pipe shall be placed no lower than 1 foot above the bottom of bridge or three (3) feet above the one hundred (100) year floodplain, whichever is higher.



Underground valves shall be provided at both ends of the aerial crossing so that the section can be isolated for testing or repair. The valves shall be restrained, easily accessible and not subject to flooding. An air valve is required for all aerial crossings. Size and locations shall be determined by Engineer of Record and approved by the City.

Appropriate guards shall be installed at both ends of the aerial crossing to prevent public access to the pipe, as shown in the Technical Detail A-108.

R1221 SYSTEM IDENTIFICATION AND COLOR CODING

All reclaimed water piping and appurtenances shall be clearly identified as reclaimed water facilities. Pantone Purple 522C is the color standard for all reclaimed water system piping and above ground appurtenances including valves, meter box lids, meter assemblies, and backflow prevention devices installed as protective measures on the reclaimed water distribution system.

All PVC piping transporting reclaimed water shall be color coded purple using Pantone Purple 522C using light stable colorants at the time of manufacture.

Above-ground metal piping and appurtenances shall be painted with a rust prohibitive primer and high-grade brushing enamel top coat, purple in color.

Underground metal pipe shall be color coded or marked using purple as a predominant color. The markings shall be permanently affixed to the top and each side of the pipe. If tape is used, tape shall be adhesive tape at least 5-mils in thickness, at least two (2) inches in width, and made of an aluminum material sandwiched between two (2) layers of polyethylene or vinyl. There shall be a minimum of three (3) colored stripes per length of pipe for pipe twenty-four (24) inches and larger. These bands shall be placed at least sixty (60) degrees apart on the pipe and shall be two (2) inches in width. For piping smaller than twenty-four (24) inches in diameter, a single colored, two (2) inch wide strip along the top of the pipe may be used. All pipes shall be laid so that the center stripe is on the top as viewed from above. In addition, the City may require use of polyethylene wrap around ductile iron pipe installations where conditions necessitate additional exterior protection. Polyethylene wrap shall be purple in color.

High Density Polyethylene (HDPE) piping shall be black and have a continuous purple strip running the full length of the pipe incorporated at the time of manufacture.

HDPE tubing shall be color coded purple using Pantone Purple 522C using light stable colorants at the time of manufacture.

One (1) inch curb stops shall be installed with valve handle bolted to tee head. Handle shall be purple and be marked "Reclaimed Water". A purple plastic marker stamped "Reclaimed Water-Do Not Drink / No Beber" (with international symbol) shall be attached to all two (2) inch curb stops.

Valve box lids shall be marked "Reclaimed" or "Reuse" and painted purple. Other visible portions of the reclaimed water system including irrigation valve box lids, meter box lids and similar device covers shall be labeled "Reclaimed Water-Do Not Drink / No Beber" (with international symbol) and color coded purple with color incorporated at time of manufacture. Sprinkler heads shall be color coded purple with color incorporated at



time of manufacture. For those devices where color coding is not feasible, the City shall approve alternative measures for identifying portions of the reclaimed water system.

Purple, electronic ball-type marking devices shall be placed every one hundred (100) feet along reclaimed water main and be placed at each valve, fitting and directional change.

Twelve (12) AWG purple tracing wire shall be run continuously and directly on top of all transmission, distribution, and HDPE service line piping.

Three (3) inch wide (minimum) metallic marking tape identified with the words "Reclaimed (or Reuse) Water–Do Not Drink" shall be installed over all transmission and distribution pipe installed using the open-trench method. Caution is to be used to maintain marker tape over pipe during backfill operation.

All reclaimed water valves and outlets shall be appropriately tagged or labeled to warn users and the public that the water is not intended for drinking.

R1222 SIGNAGE

For all systems, there shall be readily identifiable reclaimed water notification signs placed where the use of reclaimed water is practiced. Notification signs shall be posted at all entrances to residential neighborhoods, parks, commercial and industrial developments, medians, right-of-ways, at the entrances to golf courses, at the first and tenth tees, on scorecards and decorative features. Signage shall not be placed behind landscaping and other visual obstructions.

Notification signs shall be posted adjacent to lakes or ponds used to store reclaimed water with a minimum of four (4) signs or as determined by the City. Notification signs shall be in accordance with Chapter 62-610, Reuse of Reclaimed Water and Land Application, Part III, F.A.C. and City of Melbourne Code of Ordinances. See Technical Detail A-300 and A-301.

Additional signage may be required where conditions warrant and will be determined by the City during plan review process.

R1223 RECLAIMED WATER HOSE BIBS

Hose bibs on reclaimed water system shall be permitted only as allowed by Chapter 62-610, Reuse of Reclaimed Water and Land Application, Part III, F.A.C. and the City of Melbourne Code of Ordinances.

R1224 MAJOR USERS OF RECLAIMED WATER

Golf courses and other major users (over 100,000 gallons per day annual average) may be required to install a pond or other storage system, meter and equipment to monitor and control the flow entering the property and acquire all applicable permits from appropriate agencies. Prior to connection to the reclaimed water system, the major water user must enter into a service agreement with the City.

The following is a general description of each of the required components. A determination will be made during the initial application phase as to whether any or all components will be required. Contact the Reclaimed Water Distribution Division for additional details.



1. Storage/Pond Level/Storage Level Sensor
The major user is responsible for installing and maintaining in good operating condition, one or more level sensors. The type of sensor shall be approved by the City. The volume of the on-site storage system shall be equal to or greater than the peak daily demand during a 24 hour period.
2. Control Valve, Operator, and Electronic Controller
A control valve shall be installed at the metering station and shall be configured to sustain upstream pressure and shall shut off when commanded from a remote location. In conjunction with an electronic controller, the valve shall maintain a flow rate set-point.
3. Pressure Gauges and Pressure Transmitter
Pressure gauges shall be installed on the upstream side and downstream side of the metered connections. Pressure transmitters shall be installed to transfer signal to real-time monitoring and control system on the upstream and downstream side of the metered connections.
4. Flow Meter
A flow meter shall be installed to provide local totalization and indication of specified flow. Flow range and totalizer unit digit value shall be suitable for the expected flow rate in the pipeline. Unit shall also include an integral transmitter to output a loop-powered 4-20ma signal proportional to flow.
5. Real-time Monitoring and Control Panel with PLC
The real-time monitoring and control field panel shall be installed at the metering station. The field panel shall contain all components necessary for both local and remote monitoring and control of metering stations, including programmable logic controller (PLC), radio, local display for levels and pressures, electronic interface controller, flow meter, antenna, open/close/remote hand switch, power supplies to control circuitry, and surge suppression. Provide all programmables as necessary for operating system. The City's SCADA provider is Dataflow Systems.

R1300 MATERIAL SPECIFICATIONS

These specifications cover the pipes, fittings, and appurtenances used for reclaimed water distribution systems. Acceptable manufacturers, products and product numbers can be referenced in [Appendix B: Approved Products List](#).

The Contractor shall replace, at his expense, all materials found to be defective or damaged in handling and storage. The Contractor shall, if requested by the City, furnish certificates, affidavits of compliance, test reports, or samples for 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.



R1301 PIPE

R1301-1 POLYVINYL CHLORIDE (PVC)

PVC pressure pipes size four (4) inch through twelve (12) inch shall be SDR 18 and comply with AWWA C900 standard, Latest Edition.

PVC pressure pipes size sixteen (16) inch through thirty-six (36) inch shall be SDR 25 and comply with AWWA C905 standard, Latest Edition.

All joints shall be of the elastometric-gasket type with thickened, integral solid-wall bell or coupling with the same SDR as the barrel and conform to the requirements of ASTM D3139. The gasket shall meet the requirements of ASTM F477.

All PVC pressure pipe used for reclaimed water distribution systems shall be purple in color having been impregnated into the structural resin at the pipe manufacturing plant. Purple color shall be Pantone 522C.

At no time shall solvent weld pipe be allowed in the distribution system.

R1301-2 DUCTILE IRON PIPE

Ductile iron pipe shall be in accordance with ANSI A21.5/AWWA C150 and conform to requirements of ANSI A21.5/AWWA C151-2002 or latest standards.

Push-on, and restrained joint pipe shall have a minimum rated working pressure of one hundred fifty (150) psi. All buried pipe shall be pressure class as follows:

- 4 inch - 12 inch Pressure Class 350
- 16 inch - 20 inch Pressure Class 250
- 24 inch Pressure Class 200
- 30 inch - 64 inch Pressure Class 150

Pipe wall thickness shall be in accordance to bury depth as specified in the above referenced AWWA latest editions. Restrained joint ductile iron pipe shall be required, in conjunction with all conflict crossings and/or in situations that the City deems necessary.

All ductile iron shall be cement-lined and seal-coated in accordance with ANSI A21.4-2003/AWWA C104.

All ductile iron pipe for underground installation shall be outside coated with a 1-mil thick bituminous material applied by means of airless spray or other factory approved method.

The City may require use of polyethylene wrap around ductile iron pipe installations where conditions necessitate additional exterior protection Polyethylene wrap shall be purple in color, 8-mil linear low-density polyethylene or 4-mil, high density, cross-laminated polyethylene encasement installed as per ANSI A21.5/AWWA C105.

R1301-3 HIGH DENSITY POLYETHYLENE PIPE (HDPE)

Reference Section R1513 for HDPE material specifications.



R1302 VALVE AND VALVE BOXES

R1302-1 RESILIENT SEAT GATE VALVES - (2 inch)

All two (2) inch gate valves located below grade must be ductile iron resilient seat and shall meet or exceed AWWA C509/C515 specifications. The interior and exterior of the valve body shall be fusion-bonded epoxy coated in order to provide a corrosion resistant seat, in accordance with AWWA C550, applied in a manner to withstand the action of line fluids and operation of the sealing gate under long-term service. All two (2) inch gate valves shall have a standard two (2) inch operating nut and standard FIPT inlet and outlet. Opening shall be in the counter-clockwise direction. The upper bonnet assembly shall be bolted to the lower valve body with 304 stainless steel hardware.

No bronze/brass type gate valves will be accepted in underground applications.

R1302-2 RESILIENT SEAT GATE VALVES - (4 inch – 24 inch)

Ductile iron resilient seat gate valve as described shall be used on all reclaimed water mains sized from four (4) inch through twenty-four (24) inch.

All gate valves shall incorporate resilient seats and mechanical joint ends.

All gate valves shall meet or exceed AWWA C509/C515, Latest Edition. Resilient seats shall be of synthetic rubber and be bonded to the gate and shall be rated at a working pressure of two hundred fifty (250) psi.

The interior and exterior of the valve body shall be fusion-bonded epoxy coated in accordance with AWWA C550, Latest Edition in order to provide a corrosion resistant seat, applied in a manner to withstand the action of line fluids and operation of the sealing gate under long-term service. Valve seats shall seal by compression only. Valves shall be supplied with two (2) inch square operating nuts and shall be designed to provide a bubble tight seal regardless of direction of flow. Opening shall be in the counter-clockwise direction. The upper bonnet assembly shall be bolted to the lower valve body with 304 stainless steel hardware.

During plan review process, the City may determine need for alternate valve design to accommodate bury depths.

R1302-3 BUTTERFLY VALVES (30 inch and greater)

Butterfly valves shall be designed, manufactured, and tested in accordance with AWWA C504, AWWA Class 150B, latest revision, and include the following design features: Valves shall be rated and tested for absolute, zero leakage shut-off.

Valve body shall be ductile iron per ASTM A536 Grade 65-45-12. Flanged end valves shall be faced and drilled per ANSI B16.1, Class 125. Mechanical joint ends shall be per ANSI A21.11 and include mechanical joint end accessories.

Valve body to include a stainless steel seat ring that is mechanically retained without use of clamping devices, adjusting segments, or other hardware being in the waterway.

Valve disc shall be solid type ductile iron without any external vanes, ribs, etc. to obstruct flow. Resilient seat shall be located on edge of disc, offset from the shaft, and seal against mating stainless steel body seat with three hundred sixty (360) degrees uninterrupted contact. The resilient seat shall be locked to the disc by three separate



means of retention, and be field adjustable, if necessary, with no tools other than a standard socket wrench. Replacement of seat in field shall be possible without valve disassembly.

The disc shall be connected to the offset stainless steel shaft by locked taper wedge keys and stainless steel retaining nuts on the stainless steel for added strength. Shaft material construction shall be in accordance with ASTM A276 (Type 304). Shaft shall be stub type for valves thirty (30) inch and larger. The valve shall be equipped with adjustable thruster for centering the disc on thirty (30) inch and larger valves if required.

Shaft shall have nylon sleeve or woven teflon fiber-glassed backed sleeve for bearing surfaces. Bearings shall be self-lubricating.

Manual actuators shall be manufactured and assembled to the valve by the valve manufacturer. They shall be direct mounted to the valve or be located on top of an extended bonnet as required. All actuators shall be worm gear or LS Traveling Nut with external adjustable stops only and be capable of holding disc stationary in any position under full rated pressure. Stop-limiting devices must withstand three hundred (300) ft./lbs. of input torque without failure. All buried or submerged actuators shall be totally enclosed. All above ground service valves shall have a position indicator.

All external hardware for buried valves shall be stainless steel type 304.

The valve interior and exterior surfaces shall be coated in accordance with the latest revisions of AWWA C504.

R1302-4 VALVE BOXES

Cast iron valve boxes shall be provided for all valves installed underground. The valve boxes shall be adjustable to fit the depth of earth cover over the valve and shall be designed so as to prevent the transmission of surface loads directly to the valve or piping. The valve boxes shall be manufactured of integral cast iron unit and shall be of the two piece telescopic and adjustable screw type design, including a bottom section and top section with lid cover. Lids shall be stamped "Reclaimed Water" or "Reuse Water".

The casting shall be manufactured of clean, even grain, gray cast iron with a minimum tensile strength of twenty-one thousand (21,000) psi. It shall be smooth, true to pattern, free from blowholes, sand holes, projections and other harmful defects. The seating surface of both the lid cover and the top section shall be casted so that the cover will not rock after it has been seated, and will fit tightly with little or no play. A letter of certification may be required stating these compliances from the manufacturer.

R1303 FITTINGS

All fittings shall be ductile iron mechanical joint for use with previously specified ductile iron, PVC or HDPE pipe. Cast ductile iron fittings four (4) inch through twenty-four (24) inch shall be pressure rated at three hundred fifty (350) psi minimum. All fittings thirty (30) inch and greater shall be pressure rated at two hundred fifty (250) psi minimum.

All fittings shall conform to ANSI A21.10/AWWA C110 and/or ANSI A21.53/AWWA C153, Latest Editions. Ductile iron pipe joints shall be push-on or mechanical joints conforming to ANSI A21.11/AWWA C111. Flanged joints shall be used on all above-



ground installations and shall be faced and drilled per ANSI Standard B16.1-125 pounds.

All fittings shall be cast and machined allowing the bolt holes to straddle the vertical centerline.

Only those fittings and accessories that are of domestic (USA) manufacture or a United States based manufacturing company will be acceptable.

All fittings shall be cement-lined and seal-coated in accordance with ANSI A21.4/AWWA C104. All fittings shall have double cement lining thickness. Epoxy coated ductile iron fittings may be required as determined by the City during the plan review process.

All fittings for underground installation shall have an exterior asphaltic seal-coat conforming to ANSI A21.4/AWWA C151.

The material supplier and/or Contractor shall furnish data certified by the fitting manufacturer that the fittings are of the material specified, and shall furnish physical and chemical certifications.

All fitting manufacturers shall furnish to the engineer certifications that all fittings comply with the following requirements: All fittings shall be capable to withstanding, without bursting, hydrostatic tests of three (3) times the rated water working pressure. The results of the specified tests (AWWA Standards) shall be retained for one (1) year, and shall be available at the foundry. All fittings, furnished by the approved manufacturer(s), shall be cast and machined at one foundry location to assure quality control and provide satisfactory test data.

Note the term “manufacture” shall be construed to mean the actual foundry performing the said casting of the component. All fittings must be identified by the name of the manufacturer. Name of third party broker will not be accepted. Brokers and/or suppliers are not considered manufacturers and shall not be approved.

All manufactured ductile iron fittings must comply with the following and must be certified by the manufacturer of compliance:

- All fittings must be tested and manufactured in accordance with all applicable AWWA standards.
- The foundry of origin shall be ISO certified.
- Each fitting shall have a cast in date code that identifies the date and shift of the manufacturer of that fitting.
- Each fitting must have cast-in markings on the sides of each fitting which name the manufacturer, identify the AWWA C110/C153 pressure rating, the nominal diameter of the openings, the country where fitting was cast, the letters DI or word Ductile Iron and the number of degrees or fraction of circle of all bends.

R1304 TAPPING SLEEVES AND VALVES

Tapping sleeves size four (4) inch through twelve (12) inch shall be an all stainless tapping sleeve and be stainless steel 304/18.8 for sleeve, body (shell), branch, bolts and nuts. All fitting parts are to be heli-arc welded.

Tapping sleeves for sixteen (16) inch and larger shall be epoxy coated steel with all stainless steel hardware.



Tapping valves shall be iron body with 304 stainless steel bolts and nuts, bronze mounted gate valves, non-rising stem, open counter-clockwise, resilient seat, two (2) inch square operating nut, for vertical mounting in approximately level setting on buried water lines. The tapping valve ends shall be mechanical joint on one (1) side and standard flanged ANSI B16.1-125 with MSS SP-60 on the other. Valves shall conform to the applicable sections of these technical specifications.

R1305 SERVICE CONNECTIONS

R1305-1 SERVICE PIPE

One (1) inch service lines are to be constructed using purple polyethylene tubing, 200 psi, SDR9, CTS size conforming to specifications in AWWA C800, C901 and ASTM 2737, or Type K annealed temper soft copper tubing.

Two (2) inch service lines are to be constructed using purple polyethylene tubing, 200 psi, SDR9, CTS size conforming to specifications in AWWA C800, C901 and ASTM 2737, Type K annealed temper soft copper tubing or threaded brass pipe.

All HDPE service lines shall be constructed with one (1) strand of twelve (12) AWG purple tracing wire (two (2) strands if HDPE line is installed using the HDD method)..

For service lines larger than two (2) inch, refer to Section R1301.

R1305-2 SERVICE SADDLES

Single strap saddles may be used on four (4) inch and six (6) inch water mains for one (1) inch service taps. Double strap saddles for one (1) inch service taps shall be used on reclaimed water mains eight (8) inches or larger.

All two (2) inch service taps require a double strap saddle.

Saddles shall be all brass body with bronze straps.

R1305-3 SERVICE SADDLE CONNECTIONS

Service saddle connections for one (1) inch services shall be brass body, full port corporation stop with AWWA (CC) tapered thread inlet and compression outlet compatible with polyethylene or copper tubing or AWWA (CC) tapered thread inlet and flare outlet for copper tubing.

Service saddle connections for two (2) inch services shall be constructed using threaded brass and a resilient seat gate valve with two (2) inch square operating nut. See Section R1302-1.

R1305-4 CURB STOPS

Service control valves (curb stops) shall be brass body, full port ball valve with locking pad wing conforming to specifications in AWWA C800 and C901. Curb stop shall have compression inlet joint by FIPT outlet for copper or HDPE services, FIPT by FIPT for all brass services, or flare inlet by FIPT outlet for copper services.



R1305-5 STRAINER

Plate Strainer: (2 inch – 6 inch) shall be dual ANSI B16.1-125 flanged plate brass strainer. Straining area shall be 2x the diameter of the meter inlet. Strainer shall have removable stainless steel screen and drain plug.

Plate Strainer: (8 inch - 20 inch) shall be dual ANSI B16.1-125 flanged plate fabricated steel strainer. Straining area shall be 2x the diameter of the meter inlet. Strainer shall have removable stainless steel screen and drain plug.

R1305-6 METER BOXES

On reclaimed water line replacement projects, the City may provide meter boxes as needed on a case-by-case basis. Should boxes be supplied by Contractor refer to Appendix B: Approved Products List for manufacturers and model numbers.

R1306 INSPECTION OF MATERIALS

Materials delivered to the job site will be subject to inspection by the City prior to installation. All materials found during inspection or during the progress of the work to be defective or not meeting specifications shall be rejected and removed from the job site without delay.

All materials delivered to the job shall be in accordance with the material specifications.

Materials not inspected by the City prior to installation shall be uncovered by the Contractor at his expense to verify compliance with these technical specifications. Copies of the packing list shall be furnished on demand.

R1400 CONSTRUCTION

R1401 PROTECTION

Temporary supports and/or adequate protection and maintenance shall be installed on all underground and surface structures encountered in the progress of the work. Structures and both public and private properties that have been disturbed shall be restored to original condition upon completion of the work.

R1402 NOTIFICATION

Official written and oral communication must be given to all properties to be affected by construction activities. Notification shall be the responsibility of the Contractor and shall be given no less than forty-eight (48) hours in advance of the actual start of construction in the area.

R1403 OBSTRUCTIONS

All utilities shall be notified prior to beginning construction. Any known obstructions shall be shown on the plans. The utmost caution shall be taken in all operations to avoid damage to existing obstruction whether or not shown on the plans. Water mains shall be designed to go over obstructions such as drainage and or sewer pipes wherever possible.



R1404 TRENCH PREPARATION

R1404-1 EXCAVATION

All excavation shall be done in accordance with the Florida Statute 553.62- Florida Trench Safety Act and OSHA 29 CFR-1926.650, Latest Revision.

A trench shall be opened so that the pipe can be installed to the alignment and depth required. It shall be excavated only so far in advance of pipe laying as necessary.

The trench shall be excavated to the depth required so as to provide a uniform and continuous bearing support for the pipe on undisturbed ground. Bell holes shall be provided at each joint to permit jointing to be made and inspected properly.

During excavation, if ashes, cinders, muck or other organic material considered unstable is uncovered at the bottom of the trench at subgrade, it shall be removed and backfilled with approved material for a depth not less than twelve (12) inches.

All backfill material shall be tamped in layers of six (6) inches to provide a uniform and continuous bearing characteristic of that area's soil condition.

Where the bottom of the trench at subgrade consists of unstable material to such a degree that it cannot be removed and replaced with an approved material to support the pipe properly, a suitable foundation shall be constructed. Excavated material shall be piled in such a manner that it will not endanger work, obstruct natural watercourse, sidewalks or driveways.

Fire hydrants under pressure, valve boxes, or other utility controls shall be left unobstructed and accessible at all times. Street gutters shall be kept clear or other satisfactory provisions made for street drainage, to include stormwater inlet protection devices. Erosion/sedimentation control devices shall be utilized in accordance with best management practices and/or Stormwater Pollution Prevention Plan. All surface materials, which are suitable for reuse in restoring the surface, shall be kept separate from the excavated materials.

R1404-2 SHEETING AND BRACING

Open cut trenches shall be sheeted and braced as required by, Florida Statute 553.62- Florida Trench Safety Act and OSHA 29 CFR 1926.650, Latest Revision, and as may be necessary to protect life, property and/or the work.

Trench bracing may be removed after the backfilling has been completed or has been brought up to such an elevation as to permit its safe removal. The use of a trenching box may be used in place of sheeting and bracing as long as said box is in compliance with above referenced OSHA regulations.

R1404-3 DEWATERING

All dewatering procedures shall be in strict adherence to St. John's River Water Management District and FDEP regulations.

Water shall not be allowed in the trench at any time. An adequate supply of well points, headers and pumps, all in first class operating condition, shall be used to remove the ground water. The use of gravel and pumps shall also be an acceptable means of removing the water on a case-by-case basis as approved by the City. At no time shall



any pumps emit an unacceptable noise level or Contractor will be required to shut down pumping operations.

The trench shall be excavated no more than the available pumping facilities are capable of handling. The discharge from pumps shall be routed to settling basins or other acceptable erosion and sedimentation control devices prior to discharging to natural or existing drainage channels or storm sewers. Any and all plans, permits, laboratory analysis and associated fees required for dewatering are the responsibility of the Contractor and shall be obtained prior to commencement of construction.

R1405 PIPE LINE CONSTRUCTION

All reclaimed water mains, service lines and appurtenances shall be installed as specified in these technical specifications and in accordance with the approved plans and appropriate standard detail sheets as provided herein.

Construction sequencing shall be such that pipeline is constructed in one direction and does not terminate in the middle of pipe segment. The bottom of the trench shall not be excavated below the specified grade. If undercutting occurs, the bottom of the trench shall be brought up to the original grade with approved material, thoroughly compacted as directed by the City Engineer and/or City Engineer's representative.

Before placing pipe into the trench, the outside of the spigot and the inside of the bell shall be wiped clean and dry, free from oil and grease. Every precaution shall be taken to prevent foreign material from entering the pipe. During laying operation, no debris, tools, clothing or other material shall be placed in the pipe.

All mechanical joints shall be made up in strict accordance with the manufacturer's specifications. Gaskets shall be evenly seated, the gland placed in position with the bolts, and evenly tightened.

All slip joints shall be made up in strict accordance with the manufacturer's specifications. The bell shall be carefully cleaned before the gasket is inserted.

After placing a length of pipe in the trench, the spigot end shall be centered in the bell, the pipe forced home and brought to correct alignment. Prior to covering with an approved backfill material, one (1) strand of twelve (12) AWG insulated purple tracing wire shall be placed directly on top of pipe and HDPE service lines (2 strands if HDPE line is installed using the HDD method) prior to any backfilling. Contractor is responsible for maintaining wire on top of pipe either with use of industrial grade tape or wrapping wire around fittings and bells. Wire splices shall be made using wire nuts with silicone sealant appropriate for direct bury applications. Using tape to wrap splices is not acceptable. All new reclaimed water systems shall be sounded prior to or during the pre-final inspection to assure a continuous strand of wire. Any disruption of sounding shall be repaired by the Contractor and re-sounded prior to final acceptance. Where repair is not practical, soft-digs shall be provided and an electronic ball marker shall be placed on portions of the pipe where sounding cannot be re-established in intervals not to exceed twelve (12) feet. Wire end shall terminate at closest valve. Wire shall be brought up to grade along outside of valve box, then inserted into valve box between the top and bottom sections of box. Wire shall be coiled up just underneath valve box lid so wire can be extended a minimum of twelve (12) inches out of valve box.



All pipe is to have a three (3) inch wide metalized marker tape installed over the pipe after the backfill, in the secondary zone, is compacted; but no less than eighteen (18) inches of ground cover shall be provided over marker tape. Marker tape shall be identified with the words "Reclaimed Water". Caution to maintain marking tape over pipe during backfill operation is imperative. Electronic ball-type marking devices shall be placed every one hundred (100) feet along reclaimed water main. Marking devices shall be placed directly on top of main and contractor shall ensure device remain in place during backfill operations. In addition, marking devices shall also be placed at each valve, fitting and directional change.

Pipe will be installed with thirty (30) inch minimum cover. Maximum cover of forty-two (42) inches will be accepted. Cover depth will be determined from finished grade at the location of the pipe as indicated on the plans.

Exception to stated depth requirement will be those portions of reclaimed water main within casings or those portions that go over or under storm drains, sanitary sewers or other utilities as shown on plans. In all such cases, water main shall be immediately brought back to proper grade by way of mechanically restrained mechanical joint fittings. See Technical Detail A-105.

In those cases where depth differences are extreme or other circumstances prevent the use of offset fittings, properly restrained mechanical joint forty-five (45) bends can be used in conjunction with ductile iron pipe. All said restraints must meet or exceed the standards as specified by the DIPRA engineering tables. Reference Technical Drawing A-111. Alignment and depth of pipe will be spot checked during construction and/or "As-Built" inspections.

Where internal restrained joints are used, the entire bell shall be painted red with high quality enamel paint.

At all times when pipe laying is not in progress, the open ends of the pipe shall be closed by a water-tight plug or other approved means. This provision shall apply during the noon hour as well as overnight. If water is in the trench, the seal shall remain in place until the trench is pumped completely dry.

For color coding requirements of non-plastic pipe, reference Section R1221.

The City may require use of purple polyethylene wrap around ductile iron pipe installations where conditions necessitate additional exterior protection.

R1406 BACKFILLING

Machine excavation shall be carried to the depth above the final pipeline grade that will allow the final grading, using hand tools. If excavation is carried below the required depth, the overcut depth shall be backfilled with Type "B" backfill material or bedding material compacted to provide pipe support at least equal to that of the original material.

Contractor may, at their option, elect to overcut the trench using machine excavators and backfill with Type "B" backfill or bedding material, as above, to minimize the hand excavation. If Contractor so elects, the depth of overcut shall be such that a minimum of two (2) inches of compacted backfill material will result under the lowest projection of the pipe bell.

Type "B" - This material shall be a select granular material free from organic matter and of such size and gradation that the desired compaction can be readily attained.



Type "D" - This material shall be unclassified material obtained from the Contractor's excavations. The material shall be substantially free from wood, roots and other organic matter. The maximum size of stone shall not exceed three (3) inches.

Trees, stumps and roots within the limits of the trench excavation shall be removed to a depth of at least twelve (12) inches below the bottom of trench. Stump and root holes shall be refilled to existing grade and compacted by tamping. No stumps, roots, or organic matter of any description shall remain under concrete slabs or footings.

The trench shall be excavated so that the pipe can be laid to the alignment and grades shown on drawings.

The trench shall be dry when the bottom is prepared. A continuous trough shall be excavated by hand to receive the bottom one hundred twenty (120) degrees of the pipe barrel. In addition, bell holes shall be excavated so that after placement only the barrel of the pipe receives bearing pressure from, and is uniformly supported by, the bottom of the trench.

Preparation of the trench bottom and placement of the pipe shall be such that the final position of the pipe is true to line and grade and uniformly supported throughout the barrel of each pipe length. When pipe is placed in backfill over rock or other material, additional backfill of the same material shall be tamped on each side of the barrel to the height of the spring line, thus forming a trough of firm bedding.

Wherever excavation of the trench exposes unsuitable materials such as peat, soft clay, quicksand or other unstable material in the bottom of the trench which, in the opinion of Engineer of Record, is unsuitable foundation upon which to lay or support the pipe backfill and expected superimposed loads, such unsuitable materials shall be removed to a depth necessary to reach material having adequate bearing capacity and a width of trench at least equal to the minimum trench width as specified. The City reserves the right to require soils report for determination of suitable material. The spaces created by removal of this unsuitable material shall be backfilled using Type "B" backfill or bedding material. The backfill material shall be placed in eight (8) inch layers and compacted, using mechanical compaction equipment, to a dry density equal to ninety-eight (98) percent under roads, curb, gutter and shoulders; ninety-five (95) percent in all other places, of the maximum dry density as determined by the Modified Proctor Compaction Test, AASHTO T-180 each layer being compacted to the required density prior to placing the next layer.

After the pipe has been properly laid and inspected, Type "D" backfill shall be carefully placed around the pipe to a depth of six (6) inches over the pipe. The backfill material shall be carefully placed loosely in horizontal layers, equally on both sides of the pipe, and shall be spaded, "walked-in" and compacted with hand tampers to obtain a firm, dense support for the pipe. When one such layer is completed on both sides of the pipe, a second layer shall be started. The backfill material shall not be obtained from the trench walls within one (1) foot above top of pipe. Use mechanical tamping equipment. No further backfilling will be permitted until the initial backfill has been accomplished by an approved method.

Above the level of the initial backfill, the trench shall be filled with material placed in accordance with one (1) of the following classifications:

- 1) Compacted Backfill:



Materials for compacted backfill shall be Type "D" except as otherwise shown on drawings or specified. The backfill material shall be placed in horizontal layers not exceeding twenty-four (24) inches in loose depth and compacted by power operated tampers, rollers, or vibratory equipment to a specified dry density as determined by AASHTO T-180. Each layer shall be compacted to the specified density prior to placing subsequent layers. The thickness of the loose layer may be increased when in-place densities show that the specified density can be obtained. Compacted backfill shall be used in all street and road rights-of-way.

2) Plain Backfill:

Material for plain backfill shall be Type "D". Plain backfill shall be placed where compacted backfill is not required. The backfill material may be placed in layers, each layer being compacted so that a depression does not form along the trench line. Any depression formed by settlement of the backfill shall be immediately filled by the Contractor.

The Contractor shall hire a testing laboratory approved by the State of Florida to perform density testing of backfill. One (1) set of density tests shall be performed at two hundred (200) foot intervals staggered along the pipe run. The City reserves the right to require density tests at other locations as the inspector may deem necessary. Each set of density tests shall consist of one (1) test two (2) feet above the crown of the pipe and one (1) test for each one (1) foot interval up to the bottom of the sub-grade or to the ground surface if not under a road. The minimum required field densities are as follows: ninety-eight (98) percent of the maximum density determined by the Modified Proctor Compaction Test, AASHTO T-180, under roads, curbs, gutters and roadway shoulders; ninety-five (95) percent of the maximum density per AASHTO T-180 outside road rights-of-way.

R1407 VALVES AND FITTINGS

All valves and fittings shall be set and joined to the pipe in the proper location as specified in the plans. A roadway valve box shall be provided for every valve. This valve box shall not transmit shock or stress to the valve and shall be centered and plumb over the wrench nut of the valve. A valve nut extension shall be secured to valves deeper than forty-eight (48) inches from finish grade as per standard drawings. Reclaimed Water Distribution Department must give approval for all valves deeper than forty-eight (48) inches prior to installation. The box cover should be flush with surface of the finished pavement or grade level as specified in the plans.

A bronze or stainless steel three (3) inch diameter disc shall be cast into the pad for all valves two (2) inch or larger. Marking disc shall be attached to tracing wire inside valve box for valves located within pavement

Valve nomenclature to be stamped into the disc shall include the valve size, the type of valve, utility type, direction to open, and the number of turns to open. See Technical Detail A-115.

Valve boxes shall be set flush with finished pavement, squarely centered to permit easy use of a valve wrench, and set to prevent surface loads from being transmitted to the valve or pipe. Field manufactured extensions will not be accepted. Valve box lids shall have the word 'Reclaimed Water' or 'Reuse' cast on the top. All valve boxes located outside of roadway pavement shall have a three thousand (3,000) psi concrete pad



poured around the box at finished grade level (24 inch x 24 inch x 8 inch with a minimum of four (4) sections of #5 reinforced rod located at right angles to each other). All reclaimed water valve box tops shall be painted purple with approved paint. In addition, all valve locations shall be scored with a "RV", one-fourth (1/4) inch deep, four (4) inches wide and six (6) inches long, in nearest curb with point of "V" facing valve and the "RV" painted purple.

Valve box risers will not be permitted on new construction. Valve box risers will only be allowed on existing valve boxes that require pavement overlay.

R1407-1 AIR VALVES

Air valves shall be installed above ground and in an enclosure. Above ground enclosure shall be installed as close to the right-of-way as practical. Installation of air valve in traffic bearing pre-cast concrete vaults may be necessary, as determined by the City on a case-by-case basis.

A full-port brass ball valve with handle must be installed in between tapping saddle and air valve. Tapping saddle shall meet the requirements of Section R1305-2.

Fittings from the main to the brass ball valve shall be iron-pipe thread, brass rated for two hundred (200) psi. At no time will galvanized fittings be allowed on air valve installations.

R1408 MECHANICALLY RESTRAINED FITTINGS

Mechanical joint restraints shall be installed at all connections, on any bends, tees, fire hydrants, and dead end valves as specified on the plans. Mechanical restraint schedule must be adhered to in all cases, see Technical Detail A-111. All restraint fittings shall be domestically manufactured or manufactured by a company based in the United States following same quality control standards of a domestic company.

R1409 PIPE INSTALLED IN CASING

Pipe to be installed by the jack and bore method and shall be installed through steel casing, which has been jacked and/or bored. Casing shall extend beyond edge of pavement ten (10) feet.

Casing size shall be as indicated below:

<u>Pipe Size</u>	<u>Minimum Casing Size</u>
4"	12"
6"	14"
8"	18"
10"	20"
12"	24"
16" or larger	In accordance with manufacturer's recommendation

Reclaimed water mains shall be pushed or pulled through the casing on casing spacers placed at five (5) foot intervals. Mechanically restrained joints are required on all mains installed within casings.



Casing spacers shall be all stainless steel with high-density polyethylene or glass filled polymer runners.

All casing ends shall be sealed with appropriate rubber seals secured by stainless steel straps. Casing end seals shall be of the same manufacture as the casing spacers.

Casing vents shall be installed on ends of casing pipe prior to casing seals. Vents four (4) inches and smaller shall be constructed of PVC pipe. Vents six (6) inches and larger shall be constructed of ductile iron piping. Vents shall terminate below grade in approved meter box outside of pavement.

R1410 BLOW OFFS

Blow offs are to be installed at all dead ends. Gate valves for blow offs shall be accessible through valve box as previously indicated in specifications.

Blow offs shall be constructed of all threaded brass in accordance with Technical Detail A-124. At no time will galvanized fittings be allowed on blow off installations.

R1500 HORIZONTAL DIRECTIONAL DRILL

R1501 GENERAL

This section includes materials, performance and installation standards and Contractor responsibilities associated with the furnishing of all labor, materials, equipment and incidentals required to install and complete trenchless installation of pressure mains.

The Contractor shall furnish all material, equipment, transportation, tools, and labor to install pipe by directional drilling method, or direct trenchless pipe installation as required, and all related work for complete installation.

NOTE: Sizing of HDPE pipe shall be based on nominal pipe diameters and shall be equivalent to C900 piping systems.

R1502 EXPERIENCE

The Contractor must demonstrate expertise in horizontal directional drilling (HDD) trenchless methods by providing a list of ten (10) utility projects similar in scope performed within the State of Florida within the last two (2) years. The references should include a name and telephone number where contact can be made to verify the Contractor's capability. The Contractor must provide documentation showing successful completion of the projects used for reference. Conventional trenching experience will not be considered applicable.

All supervisory personnel must be adequately trained and will have at least five (5) years' experience in directional boring. Prior to approval for directional boring, the Contractor must submit names of Supervisory field personnel and fusion technicians and historical information of directional boring experience. Proof of certification shall be maintained on-site and made available to the City upon request. A responsible representative who is thoroughly familiar with the equipment and type of work to be performed, must be in direct charge and control of the operation at all times. In all cases the supervisor must be continually present at the job site during the actual directional bore operation. The Contractor shall have a sufficient number of competent



workers on the job at all times to insure the bore is made in a timely and satisfactory manner.

The directional boring equipment shall be designed and constructed for the intended purpose of installing the appropriate diameter pipe. Manufacturer's data shall be maintained on-site and made available to the City upon request. Contractor shall use equipment that is in good working condition and free of damage, including drilling machine, drill pipe, drill bits, cables, pipe pulling devices, swivels, tracking equipment and all other equipment necessary for a complete horizontal directional bore installation of the pressure main.

R1503 WARRANTY

The HDD Contractor shall supply to the City a two (2) year warranty. The warranty shall include materials and installation and shall constitute complete replacement and delivery to the site of materials and installation of same to replace defective materials or defective workmanship with new materials/workmanship conforming to the specifications.

R1504 JURISDICTION OF WORK

For installations not within the jurisdiction of the City, the Contractor shall comply with regulations of the governing authority. State highway casing installations shall be as specified in the Florida Department of Transportation "Utility Accommodation Manual" as supplemented by the Florida Department of Transportation permit and/or Florida Department of Environmental Protection permit.

R1505 REFERENCED STANDARDS

The work shall conform to applicable provisions of these technical specifications and the following standards, latest editions:

- AWWA C906: Polyethylene Pressure Pipe and Fittings, 4 inch through 63 inch
- ASTM D618: Standard Methods of Conditioning Plastics and Electrical Insulating Materials for Testing
- ASTM D638: Standard Test Method for Tensile Properties of Plastics
- ASTM F714 Standard Specification for Polyethylene (PE) Plastic Pipe (SDR-PR) Based on Outside Diameter (IPS/DIPS)
- ASTM D1238: Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer
- ASTM D1248 : Standard Specifications for Polyethylene Plastics Molding and Extrusion Materials
- ASTM D1505 : Standard Test Method for Density of Plastics by the Density-Gradient Technique
- ASTM D1598 : Standard Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure



- ASTM D1599 : Standard Test Method for Short-time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings
- ASTM D1603 : Standard Test Method for Carbon Black in Olefin Plastics
- ASTM D2122: Standard Method of Determining Dimensions of Thermoplastics Pipe and Fittings
- ASTM D2290: Standard Test Method for Apparent Tensile Strength or Tubular Plastics and Reinforced Plastics by Split Disk Method
- ASTM D2683: Standard Specification for Socket-type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
- ASTM D2737: Standard Specification for Polyethylene (PE) Plastic Tubing
- ASTM D2837: Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Material
- ASTM D2839: Standard Practice for Use of a Melt-Index Strand for Determining Density of Polyethylene
- ASTM D3035: Standard Specification for Polyethylene Plastic Pipe Based on Controlled / Outside Diameter (IPS only)
- ASTM D3261: Standard Specification for Butt Heat Fusion Polyethylene Plastic Fittings for Polyethylene Plastic Pipe and Tubing.
- ASTM D3350: Standard Specification for Polyethylene Plastic Pipe and Fittings Materials
- ASTM D4218: Standard Test Method for Determination of Carbon Black Content in Polyethylene Compounds by the Muffle-Furnace Technique
- ASTM F412: Standard Terminology Relating to Plastic Piping Systems

R1506 SUBMITTALS

Prior to beginning work, the Contractor shall submit an HDD work plan, specific to the site, outlining procedures and schedules to be used to execute the project. The Contractor shall submit the following required information for all individual HDD segments to the City Engineering Department.

HDD Work Plan

The HDD work plan should include a description of all equipment to be used, down-hole tools, a safety plan (including MSDS of any potentially hazardous substances to be used), traffic control plan (if applicable), an environmental protection plan and a contingency plan. The HDD work plan should be comprehensive, realistic and based on actual working conditions for the particular project. The HDD work plan should document the thoughtful planning required to successfully complete the project that includes a schedule of work activity. The HDD Contractor shall submit and obtain approval of a pre-construction bore-log depicting a plan and profile (horizontal and vertical alignment) of the proposed bore path. The bore-log shall show all utility crossings and existing structures. All deviations from the approved Construction Drawings shall be clearly identified. The HDD work plan shall specifically address the following potential problems:



- A Frac-Out and Surface Spill Contingency Plan
- Loss of returns
- Obstructions along bore path during reaming or pull-back
- Drill pipe or product pipe cannot be advanced
- Deviations from design line and grade exceed allowable tolerances
- Drill pipe or product pipe broken off in bore hole
- Collapse of product pipe or excessive deformation
- Damage to a utility
- Excessive subsidence or heave

The Contractor shall investigate and verify site specific soil and ground water conditions as necessary to select drilling fluids and design bore paths. All costs for investigations and verification shall be borne by the Contractor.

The Contractor shall submit technical data for drilling equipment including clay slurry material (including MSDS), method of installation, spoils removal units with working drawings and proposed sequence of construction for approval by the City.

The Contractor is required to bring to the attention of the City any known design discrepancies between the approved construction plans with actual tunneling methods that the Contractor will be performing. This shall be stated in writing to the City no later than the pre-construction meeting.

As part of the HDD work plan, the Contractor shall submit to the City an emergency response plan in the event of contamination of project site waterways by fluids and materials used and/or developed by the drilling process. Contractor shall certify that the equipment and material used in the response plan are available at the project site at all times during construction.

The City shall be notified two (2) working days, at a minimum, in advance of starting the drilling work. The HDD work shall not begin until the proper preparations (see HDD work plan) for the operation have been completed and approved by City Engineering Inspector.

R1507 PERMITS

The Contractor shall have all applicable permits in hand prior to construction.

R1508 QUALITY ASSURANCE

The pipe and fitting manufacturer shall have an established quality control program responsible for inspecting incoming and outgoing materials. Incoming polyethylene materials shall be inspected for density, melt flow rated, and contamination. The cell classification properties of the material shall be certified by the supplier and verified by Manufacturer's Quality Control.



HDPE Pipe Standards:

- AWWA C906 ASTM D3350. DR11 High Density Polyethylene (HDPE) distribution pipe; 4 inches to 24 inches. For pipe sizes 30 inches and larger, the HDPE may be IPS size, DR11 in accordance with ASTM D2239.
- All HDPE pipe shall be manufactured in accordance with AWWA C906, ASTM D3350/3261 standards with minimum material designation code 3608 with 4710 preferred and a minimum cell classification of 345464C.

R1509 EXECUTION

It shall be the Contractor's responsibility to perform the directional drilling work in strict conformance with the requirements of the agency in whose right-of-way or easement the work is being performed. Any special requirements of the agency such as insurance, flagman, etc. shall be strictly adhered to during the performance of work. The special requirements shall be performed by the Contractor at no additional cost to the City.

Protection of Existing Utilities- Contractor shall coordinate utilities locates with Sunshine State One-Call of Florida- 811. Once the locate service has field marked all utilities, the Contractor shall verify each utility (including any service laterals, i.e. water, sewer, reclaimed, cable, gas, electric, phone, etc.) and those within each paved area.

Verification may be performed utilizing ground penetrating radar, hand dig, or vacuum excavation. Prior to initiating drilling, the Contractor shall record on the drawings both the horizontal and vertical location of the utilities off of a predetermined baseline. The Contractor shall be responsible for all losses and repairs as a result of damage to underground utilities resulting from drilling operations. The Contractor shall make reasonable effort to locate evidence of any other potential subsurface obstructions such as piles or piers.

Work site shall be graded and filled to provide level working area. No alterations beyond what is required for operations are to be made. Contractor shall confine all activities to designated work areas.

Pipe shall be handled, stored and joined in accordance with manufacturer's specifications and/or these technical specifications. All directional drilling operations, with the exception of delivery, shall be conducted while the City inspector is present.

R1510 EXCAVATION

Required directional drilling pits shall be excavated and maintained to minimum dimension. Said excavations shall be adequately barricaded, sheeted, braced and dewatered, as required, in accordance with the applicable portions of these technical specifications.

R1511 DRILLING OPERATIONS

A City representative must be present during drill operations. Contractor shall coordinate drill operations with the City and Contractor is responsible for overtime cost incurred by the City as a result of drill operations conducted outside of normal business hours.



Installation shall be in a trenchless manner producing continuous bores.

The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, movement or distortion of surface features.

The tunneling system shall be remotely steerable and permit electronic monitoring of tunnel depth and location.

Pipe shall be handled, stored and joined in accordance with manufacturer's specifications and/or these technical specifications.

Pre-excavate pipe entry and receiving areas to provide a gradual entry of the pipe without stress to the pipe or joints and to allow free movements into the bore hole at an acceptable depth. Carefully guide pipe in such a manner as to avoid deformation of, or damage to the pipe.

Continuous monitoring of boring head is required, including across open water. Equipment shall be fitted with a permanent alarm system capable of detecting an electrical current. The system shall have an audible alarm to warn the operator if the drill head contacts electrified cables.

Contractor shall track horizontal and vertical alignment of pilot hole at intervals not exceeding five (5) feet. Contractor shall provide the City with the tracked position and inclination of the pilot hole in a bore-log report at completion of drill.

Every effort shall be made to maintain pipe installation to the minimum/maximum depth noted on approved construction plans. Where depth or shallower installations are required, Contractor shall make adjustments without additional cost to the City. Deviations from the plans may be made only with the approval of the City.

If unexpected subsurface conditions are encountered during the bore, the procedure shall be stopped. The installation shall not continue until the City has been consulted.

The Contractor shall construct the pilot hole conforming to the following alignment requirements:

- Throughout its alignment, pilot hole shall be within five (5) feet of horizontal alignment shown and no shallower than vertical alignment shown on approved construction plans or work plan.
- Alignment shall have no intermediate high points that may trap air in pipe after installation.
- Curvature of completed pilot hole shall not exceed that which after pipe installation will result in pipe wall stress greater than 0.50 yield stress.

Acceptance: If pilot hole alignment fails to conform to specified requirements, Contractor shall drill a new pilot hole with alignment meeting specified requirements.

The carrier pipe shall be installed using the wet insertion construction technique. At the Contractor's option, the pipe may be installed full of water.

Tunneling shall be performed by a steerable drill head with drill bit cutting process, utilizing liquid clay, i.e. bentonite slurry drilling fluid. The drilling fluid will maintain tunnel stability and provide lubrication during the drilling process and to reduce frictional drag while the pipe is being installed. In addition, the clay fluid shall be totally inert and contain no environmental risk. The Contractor shall have a mobile spoils recovery system on-site to remove drilling spoils from the access pits. The spoils shall be



transported from the job site and be disposed of in accordance with local, state and federal regulations.

Liquid clay type colloidal drilling fluid shall consist of high-grade, processed bentonite clay to consolidate cuttings of soil, to seal the walls of the hole and to furnish lubrication for subsequent removal of cuttings. The slurry shall be high in colloids of the bentonite type. Drilling fluid shall facilitate lubrication of the drill head, transport of drill cuttings, to stabilize the bore hole from collapse and inhibit the loss of slurry into surrounding formations. The drilling mud shall be in accordance with state/federal regulations and/or permit conditions. The Contractor shall install erosion and sedimentation control measures including, but not limited to, straw bales to prevent drilling mud from inadvertently spilling out of the entrance/exit pit.

Mechanical, pneumatic, or water-jetting methods will be considered unacceptable due to the possibility of surface subsidence.

After the initial bore has been completed, a reamer will be installed at the termination pit and the pipe will be pulled back to the starting pit. The reamer must also be capable of discharging liquid clay to facilitate the installation of the pipe into a stabilized and lubricated tunnel. All drilling fluids and cuttings brought to the surface shall be promptly removed and disposed of off-site.

Upon completion of boring and pipe installation, the Contractor will remove all fluids, materials and spills from the starting and termination pits and project sites. All pits and project sites will be restored to their original condition.

All waterways, ditches, wetlands and channels shall be protected by the Contractor from contamination by fluids and materials used and developed by the drilling process for this project. Contractor shall be fully responsible for any contamination of local waterways and wetlands by fluids and materials used and developed by the drilling process for this project.

Contractor shall maintain traffic during all phases of construction in accordance with the project specifications or HDD work plan. All open pits shall be covered and/or secured at the end of each work day.

R1512 REAMING AND PULLING

Contractor shall obtain the City's approval to proceed before enlarging pilot hole and pulling pipe into position. A City inspector shall be present to monitor the pulling of the pipe. The Contractor is to notify the City in writing two (2) working days in advance of the operation.

Pre-excavate pipe entry and receiving areas to provide a gradual entry of the pipe without stress to the pipe or joints and to allow free movement into the bore hole at an acceptable depth. Carefully guide pipe in such a manner as to avoid deformation of, or damage to, the pipe. Pipe roller may be required where ground and/or pull-back conditions dictate. When used, pipe rollers shall be of sufficient size to fully support the weight of the pipe during pull-back operations. Sufficient number of rollers shall be used to prevent excessive sagging of pipe.

While pulling pipe, Contractor shall handle pipe in a manner that does not overstress pipe. Pipe that buckles or is otherwise damaged will not be accepted; and shall be replaced with new pipes at no additional expense to the City.



Drilling constraints:

- Max drill entry (pipe exit) angle = 20 degrees
- Max ring deflection = 5/8 inch (5 percent)
- No directional drill operations and pulling operations shall exceed manufacturer's recommendation.

Contractor shall protect interior lining and exterior coating from damage. Pipe with gouges, cuts or scarring in excess of ten (10) percent of the pipe wall thickness will not be acceptable.

Contractor shall pull pipe so that a minimum of ten (10) feet of pipe is exposed on both ends of the bore. Pull-back of product pipe shall be made in continuous single pull without interruptions or delays.

A minimum of two (2) strands of locate wire shall be provided for all HDD pipe installations. Locate wire shall be twelve (12) AWG copper-clad carbon steel with 30-mils (minimum) insulation. The external color shall be purple. Locate wire shall be brought to grade at all 'entry point' and 'exit point' locations. Non-twist connectors shall be used for all splices. A sounding test will be conducted prior to acceptance. Any disruption of sounding shall be repaired by the Contractor and re-sounded prior to final acceptance. Where repair is not practical, soft-digs shall be provided and an electronic ball marker shall be placed on portions of the pipe where sounding cannot be re-established in intervals not to exceed twelve (12) feet.

Contractor shall, after pulling pipe, clean exposed ends for installation of fittings. Both ends of HDPE pipe for all horizontal directional drills shall terminate to accommodate connection to ductile iron pipe, C900 pipe or mechanical joint fittings. Said adaptor shall be attached by the butt fusion method only. Mechanical insertion methods will be evaluated and approved by the City on a case-by-case basis.

R1513 HDD MATERIAL

R1513-1 PIPE

Pipe shall be homogeneous throughout. It shall be free from voids, cracks, inclusions or defects. It shall be uniform as commercially practical in color, density, and other physical properties. Pipe surface shall be free from nicks and scratches. Joining surfaces shall be free from gouges and imperfections that could cause leakage. Pipe with gouges, cuts or scarring in excess of ten (10) percent of the pipe wall thickness will not be acceptable.

Carrier pipe size four (4) inch through twenty-four (24) inch shall be minimum DR11, DIPS, black in color with three (3) equally spaced, longitudinal purple stripes. Carrier pipe sized thirty (30) inches and larger may be IPS size, DR11, black in color with three (3) equally spaced, longitudinal purple stripes. Minimum cell classification shall be 3608 with 4710 preferred.

Pipe shall be marked with the following:

- Nominal size
- Standard material code designation



- Dimension ratio
- Pressure Class
- AWWA and ASTM specification

R1513-2 TUBING

Tubing shall be manufactured of PE 4710, High Density Polyethylene, in accordance with AWWA C901, ASTM D1248, ASTM D2737 and ASTM D3350. The tubing shall have a minimum working pressure of 200 psi with a SDR of 9 for copper tubing size (CTS) outside controlled diameter and be colored purple. Tubing shall have ultraviolet (UV) protection. Inserts for polyethylene tubing shall be 316 stainless steel. The use of brass couplings, tees and “Y” fittings are acceptable on poly service tubing, if not located under the roadway. Tubing shall be continuously marked with the following:

- Nominal size
- Pressure rating
- Manufacturer’s name or trademark
- Standard dimension ratio
- ASTM specification

R1513-3 JOINTS

Heat Fusion: Joints between plain end pipes and HDPE fittings shall be made by butt fusion. The on-site welder making the joints shall have received specific training from the manufacturer of the fittings and/or pipe being welded and shall have written proof of proper training/certification from the associated manufacturers. Only certified welders who have written training certifications from the fitting and/or pipe manufacturer, on-site, will be allowed to perform this work. Contractor shall submit fuse log prior to pressure test.

Heat Fusion Training Services: Upon request, the Manufacturer shall provide training and training materials in the Manufacturer’s recommended butt fusion, saddle fusion and to the Contractor’s installation personnel, and to inspectors representing the City. Only certified (manufacturer’s certification) employees will be allowed to complete this fusion work.

The fuse joint shall provide a leak tight joint and a positive seal against pressure or vacuum.

R1513-4 END FITTINGS

Both ends of HDPE pipe for all directional drills shall be terminated to accommodate connection to ductile iron pipe, C900 pipe or mechanical joint fittings. Acceptable method includes the butt fusion of a mechanical joint adaptor. Mechanical insertion using a stiffener and restraint shall be considered on a case-by-case basis.

For the fusion of mechanical joint adapter, butt fusion is the only allowable method. Electrofusion method will not be permitted.



Mechanical coupled joints shall maintain a leak tight joint when subjected to the same hydrostatic tests designated for the pipe.

R1513-5 PIPE TRANSITION RESTRAINT

Contractor shall protect against pullout when HDPE pipe is connected to unrestrained joint piping or components such as bell and spigot joint PVC or ductile iron. Protection measures may include external mechanical restraints, in-line anchoring or a combination of both in the transition area between the HDPE pipe and traditional pipe material. Installation of protection measures shall be in accordance with *AWWA M55 PE Pipe-Design and Installation Manual*. Restraint procedures shall be detailed in approved construction plans.

R1513-6 TRACING WIRE

Locate tracing wire shall be twelve (12) AWG copper-clad carbon steel conductor with 30-mils (minimum) insulation. The external color shall be purple.

R1514 HDD PRESSURE TESTING

All carrier piping, four (4) inches and larger, installed via horizontal directional drilling methods shall be pressure tested in accordance with Section R1603 of these technical specifications.

Contractor shall wait a minimum of twenty-four (24) hours before pressure testing of pipe. Pressure test prior to pull-back may be done under special conditions.

In the case of pipelines that fail to pass leakage test, the Contractor shall determine the cause of the leakage, shall take corrective measures necessary to repair the leaks, and shall again test the pipelines. Allow the test section to remain depressurized for at least eight (8) hours before retesting. In the event the leakage cannot be repaired, the Contractor shall abandon the pipe and notify the City.

R1515 PIPE ABANDONMENT

In the event the bore hole operations fail, Contractor shall completely fill bore hole with grout so as to prevent future settlement.

In the event Contractor cannot complete pull-back of HDPE pipe, Contractor shall cut pipe off at least three (3) feet below ground surface, grout pipe and place pipe out of service. Contractor shall fill all voids with excavatable flowable fill.

R1516 RESTORATION OF PAVED, IMPROVED AND UNIMPROVED AREAS

At the completion of the project work, the parking area pavement, shoulders, ditches, banks and slopes of property crossed and paralleled shall be restored to their former condition and properly sodded so that they shall not wash out before becoming consolidated. Restoration shall be as required by the jurisdictional authority. Parking area installations are to be continuously maintained until the completion of the work.

In the event roadway subsidence or heaving occurs during the horizontal directional drilling operation, the roadway shall be reconstructed, milled and repaved at a one hundred (100) foot distance centered on-site.



R1517 FINAL SUBMITTALS

The directional boring Contractor shall submit certification, by a Professional Engineer or Professional Land Surveyor licensed in the State of Florida, that the directional boring has been performed in accordance to the Construction Drawings, or provide signed and sealed Record Drawings of the installation if it varies from the design as shown in the Construction Drawings. Horizontal and vertical locations (bore logs) shall be shown on the Record Drawings at five (5) foot intervals.

R1600 CLEANING, FLUSHING AND TESTING

R1601 FILLING

The Contractor may physically connect reclaimed water mains to existing City reclaimed water system; however, valve must remain shut off and only opened under the direct supervision of City personnel.

R1602 CLEANING AND FLUSHING

All mains shall be flushed and cleaned to remove all dirt, sand and other foreign matter in conjunction with the initial filling. The line to be cleaned shall only be connected to the existing system at a single connection point.

The pipeline shall be cleaned with a polyurethane foam swabbing device, of an appropriate density (2 lbs/ft³) for the pipeline to be cleaned, so as not to damage the interior lining of the pipeline. If swabbing access and egress points are not provided in the design, Contractor shall be responsible to install and remove appropriate connections to accomplish the required pipeline 'pigging'.

The Contractor shall insert swab complete with rear polyurethane drive seal, into the first section of pipe. The swab shall remain there until the pipeline construction is completed.

Only City personnel shall operate the supply valve from the existing distribution system. Cleaning shall be accomplished by propelling the swab down the pipeline to the exit point. Passage of the swab through the system shall be constantly monitored, controlled and all pigs entered into the system shall be individually marked and identified so that the exiting of the pig from the system can be confirmed.

Swabbing and flushing shall continue until the water is completely clear. The discharge of reclaimed water used for flushing mains shall be controlled at all times and not cause a nuisance or property damage. At no time will discharge be allowed to overflow into swales, storm sewers, canals, ditches, etc. Construction of temporary berms or discharge into nearby sanitary sewer with sufficient capacity is an acceptable means of control. Contractor must procure written permission from owner if water is to be discharged to private property.



R1603 TESTING

All newly installed pipe which has been backfilled, shall be cleared and hydrostatically tested at a gauge pressure of one hundred fifty (150) psi for a minimum of two (2) hours as per Section R1603-1. A leakage test shall be conducted during the hydrostatic test.

R1603-1 HYDROSTATIC TEST PROCEDURE

Construction of all service lines and any/all other connections involving restrained joints and/or thrust blocking shall have been completed and inspected prior to scheduling of hydrostatic pressure test. Hydrostatic pressure test shall be scheduled with the Utilities Operations Division a minimum of two (2) working days in advance so Utilities Operations Division personnel may be present at time of testing. The line under test shall be slowly filled with water at the specified test pressure. Per Manufacturer's recommendations, ductile iron pipe must sit in a wetted condition for twenty-four (24) hours prior to testing.

The lowest elevation point on the section being tested shall be determined and any corrections necessary shall be corrected to the elevation of the test gauge.

A blow off shall be installed at the end of the line under test. Before applying the specified test pressure, all air shall be expelled from the test section including service connections. If blow offs are not available at high places, taps at points of highest elevation shall be made to facilitate testing. When testing is complete, the service shall be removed at the discretion of the Utilities Operations Division or City Engineering Inspector. Contractor shall have line cleared of air and pumped up to specified test pressure prior to scheduled appointment. If line is not holding specified pressure at time of arrival of Utilities Operations Division personnel, test will be cancelled and rescheduled at the convenience of the Division.

The line shall hold the one hundred fifty (150) psi test pressure for a minimum two (2) hour test period; sufficient manpower shall be employed to insure inspection.

If the line fails to meet the test, it shall be repaired and test rescheduled at a later date. This shall be repeated until the test requirements are satisfactory. If more than two (2) pressure tests are required on any section of line, a fee of \$125.00 shall be charged to the Contractor for each additional test.

Line pressure shall be maintained to within five (5) psi of the test pressure at all times. If at any time during hydrostatic test, the line pressure drops more than five (5) psi, test shall be considered null and void. Pressure test shall be rescheduled for a later date after leak has been repaired.

The Utilities Operations Division must be notified a minimum of one (1) full working day in advance of any pressure test cancellation, otherwise the Contractor will be charged accordingly.

R1603-2 LEAKAGE TEST

The test procedures of ANSI/AWWA C600, shall be observed. Leakage for D.I.P. during the test shall not exceed the allowable leakage specified in ANSI/AWWA C600 Equation.



No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

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

L = Allowable Leakage (gal./hr.)
 S = Length of pipe being tested (ft.)
 D = Diameter of Pipes (in.)
 P = Average test pressure (psi) during leak test

The allowable leakage for C900 PVC pipe (20 foot lengths) shall be in accordance with AWWA M23.

No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{ND (P)^{0.5}}{7,400}$$

L = Allowable Leakage (gal./hr.)
 N = Number of joints in length of pipe being tested (ft.)
 D = Diameter of Pipes (in.)
 P = Average test pressure (psi) during leak test

R1700 CONNECTION TO EXISTING SYSTEM

The Contractor shall without exception contact the City’s Utilities Operations Division a minimum of two (2) working days in advance to schedule an appointment so that the City personnel can be present at the time of connection to existing system. Contractor shall also obtain all required permits and notify all other utilities prior to excavation of existing reclaimed water main. Notice of excavation shall be given a minimum of two (2) working days in advance of actual excavation.

Size on size taps on class PVC pipe will not be allowed.

R1701 SERVICE INSTALLATIONS

Service saddles shall be used on all one (1) inch and two (2) inch service connections. Tap must be installed at the two (2) or ten (10) o’clock positions for one (1) inch service and three (3) or nine (9) o’clock positions for two (2) inch all brass services.

Services shall not terminate in a sidewalk or driveway at any time. It is the Contractor’s responsibility to ensure all services, both residential and commercial, do not terminate in a driveway or sidewalk or other materials which prevent easy excavation for maintenance and for repairs.

Temporary Marking of Services - All service line curb stop terminations shall be exposed to view prior to and during pre-final, final and "As-Built" inspection. Service line shall be attached by means of tape to a two (2) inch x one (1) inch (minimum twenty-four (24) inches in length) stake with the top painted purple and marked with the lot number to be served.

Permanent Marking of Services - All reclaimed water service locations shall be permanently etched into concrete curb with "R", one-fourth (¼) inch deep, four (4) inches wide and six (6) inches long, and painted purple. Any exception must have prior approval of the City.



One (1) inch Residential Services

All residential services shall terminate to a below grade meter. Service line shall be one (1) inch and can reduce with a one (1) inch x three-fourth ($\frac{3}{4}$) inch brass bushing after curb stop, where necessary. Double reclaimed water services shall be utilized whenever practical for three-fourth ($\frac{3}{4}$) inch or one (1) inch meter sets and can reduce after curb stop, where necessary. Double service curb stops shall be located no more than twelve (12) inches from the tee. See Technical Detail A-302.

All service lines between corporation stop and double service tee or single service curb stop shall be an unspliced full-length of copper or HDPE tubing. Brass wyes, tees or couplings on copper or tubing shall only be allowed outside of roadway.

All connections to one (1) inch copper service lines shall be flare or compression. All connections to PE service line shall be the compression type. Stainless steel metal stiffener insert shall be used when connecting to HDPE tubing.

All efforts shall be made to keep service lines at a depth not to exceed twenty-four (24) inches but no shallower than eighteen (18) inches, with a gradual upward slope so to allow depth of meter connection to be a maximum twelve (12) inches from grade. Service line shall terminate midway between the curb and the sidewalk.

All one (1) inch service lines shall terminate meter side utilizing a compression by FIPT ball curb stop for copper or PE service lines or flare by FIPT ball curb stop for copper only. A brass ball valve handle stamped with the words "Reclaimed Water - Do Not Drink" must be attached to tee head.

All "long side" services shall be installed through a purple HDPE sleeve extending beyond the edge of curb or gutter, where present. In any case, sleeves shall not terminate under roadway, curb, gutter or sidewalk. Sleeve shall be sealed at both ends with a polyurethane-base insulating foam sealant. Refer to Table R1701-1 for sleeve size.

All HDPE service lines shall be constructed with two (2) strands of 12 AWG purple tracing wire if installed using the HDD method (one (1) strand acceptable for service lines installed through casings). Tracing wire shall be brought up into the meter box and coiled up so wire is capable of being extended twelve (12) inches above meter box and grade. Locating wire can be coiled back inside box for future access.

Two (2) inch Residential Services

Two (2) inch residential services shall have prior City approval.

All residential services shall terminate to a below grade meter.

Service line shall be two (2) inch and can reduce with a two (2) inch x one and one-half ($1\frac{1}{2}$) inch brass bushing at the curb stop to accommodate one and one-half ($1\frac{1}{2}$) inch meter where necessary.

For all two (2) inch service lines constructed of copper or HDPE tubing, an unspliced, full-length of copper or HDPE tubing shall be used between the gate valve and double service tee or single service curb stop.

All connections to HDPE service line shall be the compression type. Stainless steel metal stiffener insert shall be used when connecting to HDPE tubing.



All HDPE service lines shall be constructed with two (2) strands of twelve (12) AWG purple tracing wire if installed using the HDD method (one (1) strand acceptable for service lines installed through casings). Tracing wire shall be brought up into the meter box and coiled up so wire is capable of being extended twelve (12) inches above meter box and grade.

All “long side” services shall be installed through a purple HDPE sleeve extending beyond the edge of curb or gutter, where present. In any case, sleeves shall not terminate under roadway, curb, gutter or sidewalk. Ends of casing pipe shall be sealed with a polyurethane-based insulating foam sealant. Refer to Table R1701-1 for sleeve size.

All two (2) inch service lines shall terminate meter side utilizing a two (2) inch compression by FIPT ball curb stop for HDPE service line or two (2) inch FIPT by FIPT ball curb stop for all brass service. A purple plastic marker stamped with the words “Reclaimed Water - Do Not Drink” must be attached to curb stop.

All efforts shall be made to keep service lines at a depth not to exceed thirty-six (36) inches but no shallower than twenty-four (24) inches, with a gradual upward slope so to allow depth of meter connection to be twelve (12) inches from grade.

Commercial Services

One (1) inch and two (2) inch services for commercial properties shall be constructed the same as for residential services.

In lieu of copper or HDPE, a two (2) inch service constructed of all threaded brass is permissible.

Properties that require larger service lines and meters, the reclaimed water service shall be constructed in accordance with Section R1405 and above ground meter in accordance with Technical Detail A-304.

For all road crossings, unless road conditions dictate otherwise, there will be a gate valve at the main, a gate valve on opposite side of crossing and control valve on customer side of meter assembly for isolation and maintenance. Control valve on customer side shall be located a maximum of 10 feet from meter assembly. Exception to distance shall have prior City approval.

All HDPE service lines shall be constructed with a minimum of two (2) strands of twelve (12) AWG purple tracing wire if installed using the HDD method (one (1) strand acceptable for service lines installed through casings). Tracing wire shall terminate inside the valve box installed immediately before meter assembly. For services with no gate valve before meter assembly, locating wire shall be secured to inlet pipe with clamp within twelve (12) inches of grade or terminate inside meter box.

TABLE R1701-1	
Service Line Size	HDPE Sleeve Size (SDR 9 or 13)
1 inch	2 inch
2 inch	4 inch



For commercial services larger than two (2) inch, see Section R1405 for construction requirements.

R1702 TESTING CONNECTIONS TO EXISTING SYSTEM

The Contractor shall without exception contact the City's Utilities Operation Division a minimum of two (2) working days in advance to schedule an appointment so that City personnel can be present at the time of connection to existing system. Contractor shall also obtain all required permits and notify all other utilities prior to excavation of existing reclaimed water main.

Tapping saddles and sleeves supplied by Contractors shall be approved and inspected by the on-site City representative prior to installation and shall meet all requirements of Section R1305-2 and R1304, respectively, of these Technical Specifications. The installed sleeve shall be tested with water at one hundred fifty (150) psi for twenty (20) minutes prior to the tapping to insure a watertight installation. The pressure test will be performed by a City approved Contractor and witnessed by the City's Utilities Operations Division. The Contractor shall notify Utilities Operations Division a minimum of two (2) working days in advance and schedule appointment so City personnel can be present at time of connection to existing City reclaimed water system. The Contractor shall physically verify the size and type of pipe to be tapped and clear the type of sleeve to be used with Utilities Operations Division personnel prior to purchase of tapping sleeve.

R1703 METERS

The City will furnish all water meters and meter boxes up to and including two (2) inch. All meters larger than two (2) inch shall be furnished by the Contractor and shall meet City specifications. Meter shall be installed per manufacturer's recommendations, including the upstream and downstream straight pipe diameter and turbo-style strainer requirements.

On projects that require relocation of existing facilities, Contractor may be required to relocate and reuse existing meter and box.

All below-grade meters shall not terminate more than twelve (12) inches below grade. Meter shall be installed so that the register cap is five (5) inches to eight (8) inches below meter box lid allowing adequate distance for meter transmitter.

All above-grade meter assemblies shall be installed a minimum of twelve (12) inches and a maximum of thirty (30) inches above-grade measured at lowest point of assembly.

All above-ground reclaimed water meter assemblies shall have a three thousand (3,000) psi concrete pad poured underneath assembly and shall be primed with rust inhibitive primer and painted purple. For applicable dimensions, pipe support requirements, and other details refer to Technical Detail A-304.

If tampering switch is not installed on gate valve wheels, steel chain with padlock must be installed through handwheels to prevent unauthorized operation.



R1800 CROSS-CONNECTION CONTROL

At no time shall a cross-connection between a reclaimed water system and a potable water system be allowed.

For all cross-connection control measures, on properties that receive reclaimed water, the provisions of the Florida Department of Environmental Protection (FDEP) under Rule 62-555.360, the City’s Cross-Connection Control Manual and the City’s Technical Specifications and Standards for Water Distribution Systems shall apply.

In no such case shall reclaimed water service be initiated at properties without appropriate backflow protection on all connections to the public potable water system, as determined by the City. Testing and certification documents for all backflow preventers must be received by the City before reclaimed water service is activated.

To protect the reclaimed water distribution system from backflow from private systems, a backflow device shall be required on commercial and industrial users requiring a three (3) inch or larger meter. A swing type check valve shall be installed directly downstream of meter.

Testable backflow prevention (double check valve) assemblies on reclaimed water service lines will be required on all developments that use reclaimed water with chemical injection systems that add potential contaminants such as fertilizer, pesticides, algacides, etc. and any development that utilizes a looped reclaimed water service.

All such backflow prevention devices are to be located directly following the reclaimed water meter serving the property. It shall be the Owner’s responsibility to maintain all backflow prevention devices.

Private irrigation wells used as a back-up source to the reclaimed water system must remain physically disconnected from the reclaimed water irrigation system.

R1900 INITIATION OF RECLAIMED WATER SERVICE

Prior to the property receiving reclaimed water, a preliminary irrigation system inspection will be conducted by the Reclaimed Water Distribution Division. Preliminary inspection will be scheduled at least two (2) working days in advance of the need for reclaimed water. Irrigation Contractor must be in attendance during inspection. Inspection will include items list in Table R1901-1.

TABLE R1901-1	
PRELIMINARY RECLAIMED WATER/IRRIGATION INSPECTION CHECKLIST	
1	Check for cross-connections made between potable water and reclaimed water.
2	Check for approved backflow device(s) properly installed, tested and certified on all potable and fire services. <i>CURRENT TESTING AND CERTIFICATION FORM MUST BE RECEIVED PRIOR TO INSPECTION.</i>
3	Check for properly color coded or tagged outlets, valves, boxes, and piping.
4	Check for proper set back distances as defined in F.A.C. 62-610 Part III.
5	Check for proper reclaimed water advisory signage.
6	Check for reclaimed water entering a dwelling.



7	Check for illegal use of hose bibs.
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R2000 FINAL CLEAN UP

Upon completion of the work and before acceptance by the City, the Contractor shall remove all debris, complete sodding, sprigging or seeding if required by the plans, and shall leave all areas affected by his operations in a neat and presentable condition.

A release must be signed by owners of private property that the Contractor used for storage or equipment, materials, vehicles, etc., releasing the City from any liability. Release must be submitted prior to issuance of certificate of completion.

R2100 AS-BUILT SURVEY AND RECORD DRAWINGS

As-built/record drawings are required for all constructed public utilities, as well as all private utilities constructed and connected to the public system.

Record Drawings depicting the as-built conditions of the project are required for all utility systems being accepted by the City. Record Drawings shall consist of the construction plans as prepared by the Engineer of Record and approved by the City, revised to include the information provided by the As-Built survey along with any additional deviations from the original design drawings as deemed appropriate by the Engineer of Record.

The As-Built survey must be prepared by a surveyor registered in the State of Florida and shall contain the following information:

- All property corners and control structures shall be designed with state plane coordinates. The following coordinate system shall be used: NAD 1983 HARN State Plane Florida East FIPS 0901. State Plane Coordinates shall be labeled and shown on a minimum of four (4) reference, right-of-way or property corner monuments shown on the Construction Plans that remain in their original condition after construction has been completed.
- Elevations shall be based on NGVD 1929 or NAVD 1988. Control datum consistency shall be maintained throughout drawing submittals.
- Certification stating the basis of horizontal and vertical control.
- At least two (2) ties to all valves, service lines, and fittings from permanent points (manholes, property lines, property corners, curbs, or pavement). An acceptable station and offset system may be used.
- Location of mains from property or easement lines and alignment distance from centerline of road at fifty (50) foot intervals.
- Conflict crossing details, including separation between utilities, depth of water main at lowest point of crossing and whether water main crosses over or under utility in conflict.
- Type of reclaimed water main material for each run of pipe and at any material change and distance of mains from buildings or structures within ten (10) feet of the water main.



- Pertinent easement information, including width of easement, and distance from reclaimed water main to sides of easement. Official Record Book and page number for easement must be shown on plans.
- Note the City's Point of Acceptance.
- Note all private utility systems.
- All Horizontal Directional Drilling Bore-Logs.
- A certification by the surveyor/engineer accepting responsibility for accuracy of information supplied on the As-Built drawings and a statement that all mains are within easements and/or public right-of-ways.

As-Built drawings shall be drawn at an engineering scale of one (1) inch = fifty (50) feet or larger (i.e. 1 inch = 40 feet). Areas requiring additional detail may be enlarged as necessary. Right-of-way, easements and lot lines shall be accurately shown. Lot and block numbers and street names shall be included.

Two (2) signed and sealed blue-line prints are required to be submitted to the City Engineering Department a minimum of forty-eight (48) hours prior to scheduled pre-final inspection.

If As-Built drawings are not supplied a minimum of forty-eight (48) hours prior to the scheduled pre-final inspection, the inspection will be cancelled and rescheduled. Owner will be assessed a re-inspection fee.

In addition to the hard copy submittals, a digital copy of the As-Built drawings shall be submitted to the City in AutoCAD format on a disc.

After the surveyor has certified the As-Built survey, the Engineer of Record shall incorporate that information into the conformed contract documents and include the designation that they are now Record Drawings. The Engineer of Record will certify that the system depicted on the Record Drawings was constructed in substantial conformance with approved plans and will function as intended. The FDEP requires that Record Drawings be signed and sealed by the Engineer of Record.

R2200 REQUIREMENTS FOR SCHEDULING PRE-FINAL INSPECTION

There are several criteria that projects must meet prior to the City scheduling a pre-final inspection for any development project or water line extension. The criteria are:

1. The City should receive two (2) sets of As-Built drawings at least two (2) days prior to the desired inspection date. City staff must have time to review the drawings and to confirm that the data shown is accurate.
2. The City must receive satisfactory results for the leakage and pressure test on the new reclaimed water lines. If the water lines do not pass these tests, the project is not ready for an inspection.
3. The City should receive the punch list, which has been incorporated into this section. The purpose of the pre-final inspection is to determine if the project is complete and if the work is acceptable.
4. The purpose is not to inspect a partially completed project and provide the Contractor a list of things he/she must do to complete it. In short, the project



Technical Specifications and Standards for Reclaimed Water Distribution Systems

July 1, 2016

should be complete. The punch list, checked off by the Contractor, will indicate to the City that the project is completed in the Contractor's opinion.

5. The contact for scheduling the pre-final inspection is the City Engineering Inspector who has been assigned to your project.

During the Pre-final inspection, the items listed in Table R2200-1 will be checked.

TABLE R2200-1		
RECLAIMED WATER PRE-FINAL PUNCH LIST		√
1	As-Builts received 2 days prior to pre-final inspection.	
2	All reclaimed valve boxes to be clear of debris and centered over operating nut. Operating nut will be checked for proper depth.	
3	All valves operate smoothly and have correct direction of opening.	
4	All valves constructed outside of asphalt have properly constructed 24 inch x 24 inch x 8 inch concrete valve box pad.	
5	All reclaimed water valve box lids identified as "Reclaimed" and painted purple.	
6	All valves having a "RV" etched on curb with the point facing valve and the "RV" painted purple.	
7	All boxes two-piece telescopic and adjustable. No field constructed extensions.	
8	Bronze marking disc with appropriate nomenclature installed on concrete pad on valves 2 inch and larger.	
9	All permanent and temporary blow offs are on the property line.	
10	All service assemblies free of crimps and conflicts.	
11	All service assemblies on property line between lots and between curb and sidewalk and properly secured to temporary marking post where applicable.	
12	All service lines having an "R" etched on curb and "R" painted purple.	
13	Above-ground piping and meter assemblies are primed and painted.	
14	Proper color coding, signage, setback and separations from potable water systems.	
15	Tracing wire properly terminated in meter and valve boxes, capable of extending 12 inches above grade and tested for continuity.	
16	Electronic ball markers installed every 100 feet and on all valves, fittings and directional changes.	

R2300 MAINTENANCE BOND

A two (2) year maintenance bond is required on all projects. This bond can be a cash or paper bond. This bond is for the dedicated portion of the work only. The bond is ten (10) percent or a minimum of \$1,000.00 whichever is greater.

At the end of the two (2) year maintenance bond period the following items in Table R2300-1 will be checked.



TABLE R2300-1		
RECLAIMED WATER MAINTENANCE BOND PUNCH LIST		√
1	All valve boxes checked for broken 24 inch x 24 inch x 8 inch concrete pad, proper alignment and intact bronze I.D.	
2	Settling over pipes and around valves.	
3	All above-ground meter assemblies showing signs of cracked, peeling paint or excessive rust or corrosion must be re-primed and re-painted.	

Technical Specifications
and Standards for
Reclaimed Water
Distribution Systems
Appendix A- Technical
Detail Drawings



Appendix A- Technical Detail Drawings

General Details

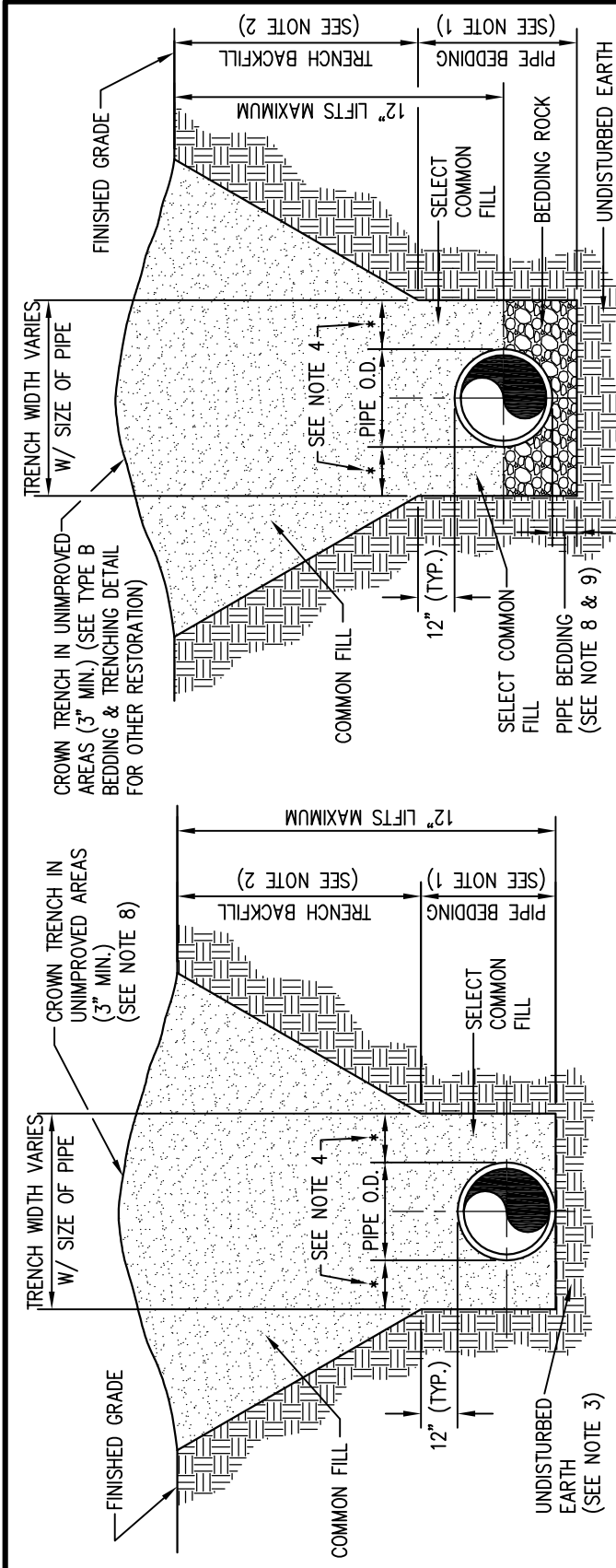
A-100	Pipe Bedding Details- Type A & B
A-101	Utility Trench Detail (Typ.)
A-102	Open Roadway Cut
A-103	Utility Pipe Minimum Separation Requirements Table
A-104	Utility Pipe Minimum Separation Requirements Figure
A-105	Utility Crossing
A-106	Typical Concrete Saddle Detail
A-107	Thrust Collar Detail
A-108	Ditch Crossing
A-109	Aerial Pipe Crossing and Barricade
A-110	Jack and Bore
A-111	Restrained Pipe Table- Potable & Reclaimed (150 psi)
A-112	Restrained Pipe Table- Wastewater (100 psi)
A-113	Gate Valve and Box
A-114	Butterfly Valve and Box Detail
A-115	Valve Box Lid, Pad and Marker
A-116	Valve Extension
A-117	Bollard Detail
A-118	Residential Services Layout- Potable and Reclaimed
A-119	Typical Service Saddle Connection- Potable and Reclaimed
A-120	Typical Tapping Sleeve Service Connection- Potable and Reclaimed
A-121	Air Valves- Above Grade (Potable and Reclaimed)
A-122	Air Valves In Vault (Reclaimed and Wastewater)
A-123	Air Valves In Vault – Offset (Reclaimed and Wastewater)
A-124	Manual Blow Off

Reclaimed Water Details

A-300	Reclaimed Water Notification Signs
A-301	Reclaimed Water Notification Signs- Storage Lakes & Ponds
A-302	Residential Reclaimed Water Meter and Meter Box
A-303	Commercial Reclaimed Water Meter- 2" and Smaller
A-304	Commercial Reclaimed Water Meter- 3" and Larger (non-telemetry)
A-305	Commercial Reclaimed Water Meter- 3" and Larger (magmeter & telemetry)
A-306	Color Coding Requirements for Reclaimed Water Irrigation Systems



General Details



- NOTES:**
- PIPE BEDDING: SELECT COMMON FILL COMPACTED TO 98% UNDER ROADS, CURB, GUTTER AND SHOULDERS; AND 95% IN ALL OTHER PLACES, OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST, AASHTO T-180
 - TRENCH BACKFILL: COMMON FILL COMPACTED TO 98% UNDER ROADS, CURB, GUTTER AND SHOULDERS; AND 95% IN ALL OTHER PLACES, OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST, AASHTO T-180
 - USE TYPE "A" BEDDING TO BE DETERMINED IN THE FIELD AS DIRECTED BY THE ENGINEER.
 - (*): 15" MAX. FOR PIPE DIAMETER LESS THAN 24", AND 24" MAX. FOR PIPE DIAMETER 24" AND LARGER.
 - WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION.
 - ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF FLOW FOR SEWERS.
 - REFER TO SPECIFICATIONS FOR SHEETING AND BRACING IN EXCAVATIONS.
 - GRAVITY SEWERS SHALL UTILIZE TYPE "A" BEDDING, IF REQUIRED BY THE ENGINEER. BEDDING DEPTH SHALL BE 4" MINIMUM FOR PIPE DIAMETER LESS THAN 15", AND 6" MINIMUM FOR PIPE DIAMETER 16" AND LARGER.
 - DEPTH FOR REMOVAL OF UNSUITABLE MATERIAL SHALL GOVERN DEPTH OF BEDDING ROCK BELOW THE PIPE. THE ENGINEER SHALL DETERMINE IN THE FIELD REQUIRED REMOVAL OF UNSUITABLE MATERIAL TO REACH SUITABLE FOUNDATION.

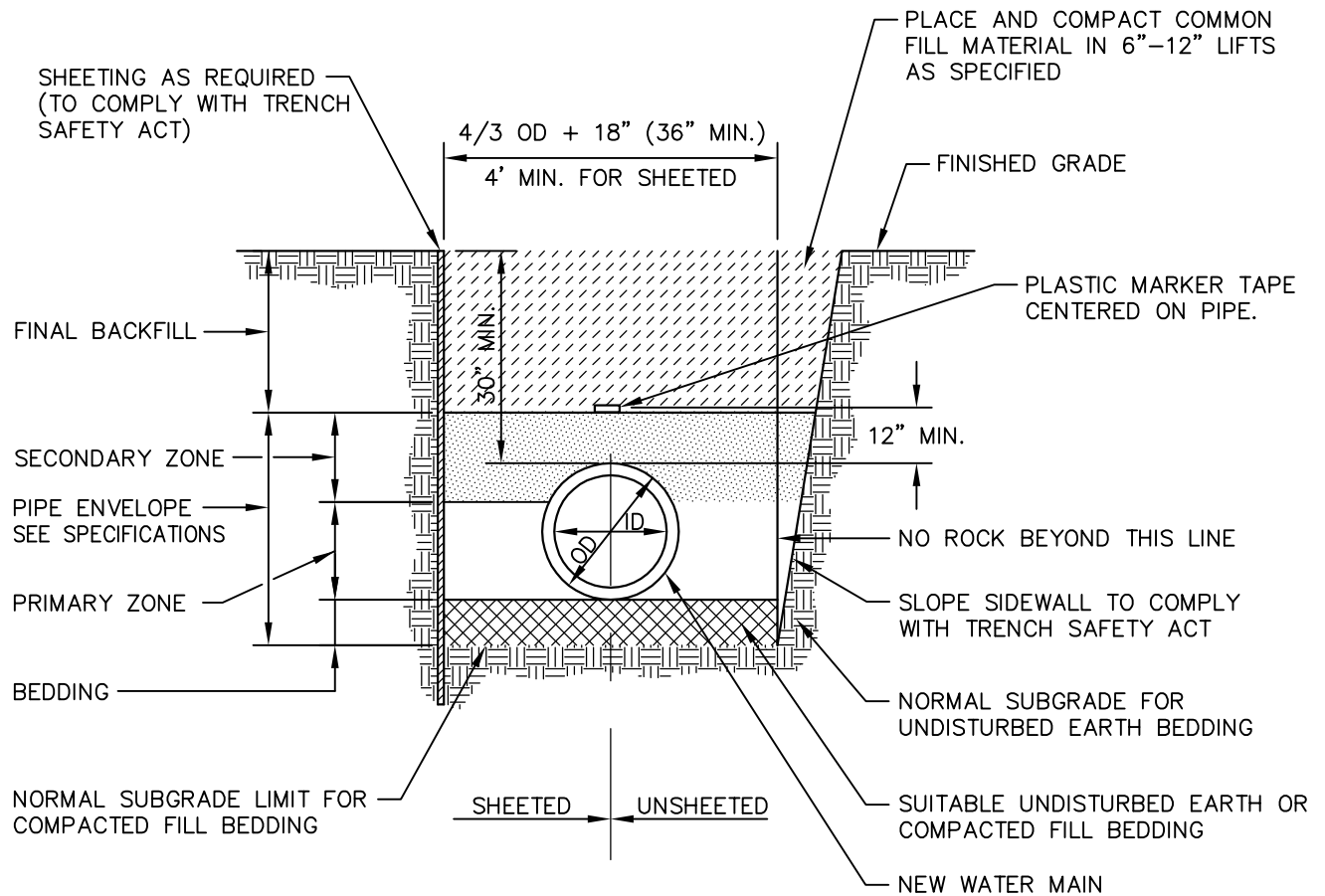
- NOTES:**
- PIPE BEDDING: SELECT COMMON FILL COMPACTED TO 98% UNDER ROADS, CURB, GUTTER AND SHOULDERS; AND 95% IN ALL OTHER PLACES, OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST, AASHTO T-180
 - TRENCH BACKFILL: COMMON FILL COMPACTED TO 98% UNDER ROADS, CURB, GUTTER AND SHOULDERS; AND 95% IN ALL OTHER PLACES, OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST, AASHTO T-180
 - PIPE BEDDING UTILIZING SELECT COMMON FILL OR BEDDING ROCK IN ACCORDANCE WITH TYPE "A" BEDDING AND TRENCHING DETAIL MAY BE REQUIRED AS DIRECTED BY THE ENGINEER.
 - (*): 15" MAX. FOR PIPE DIAMETER LESS THAN 24", AND 24" MAX. FOR PIPE DIAMETER 24" AND LARGER.
 - WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION.
 - ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF THE FLOW FOR SEWERS.
 - REFER TO SPECIFICATIONS FOR SHEETING AND BRACING IN EXCAVATIONS.
 - FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH SPECIFICATIONS. ROAD SURFACE RESTORATION SHALL COMPLY WITH SPECIFICATIONS.

PIPE BEDDING DETAILS TYPE "A" & "B"

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
DRAWN BY:	DSGN. BY:		DWG NO.:
7/1/16	L.A.M.		A-100

DETAIL -- TYPE A

DETAIL -- TYPE B



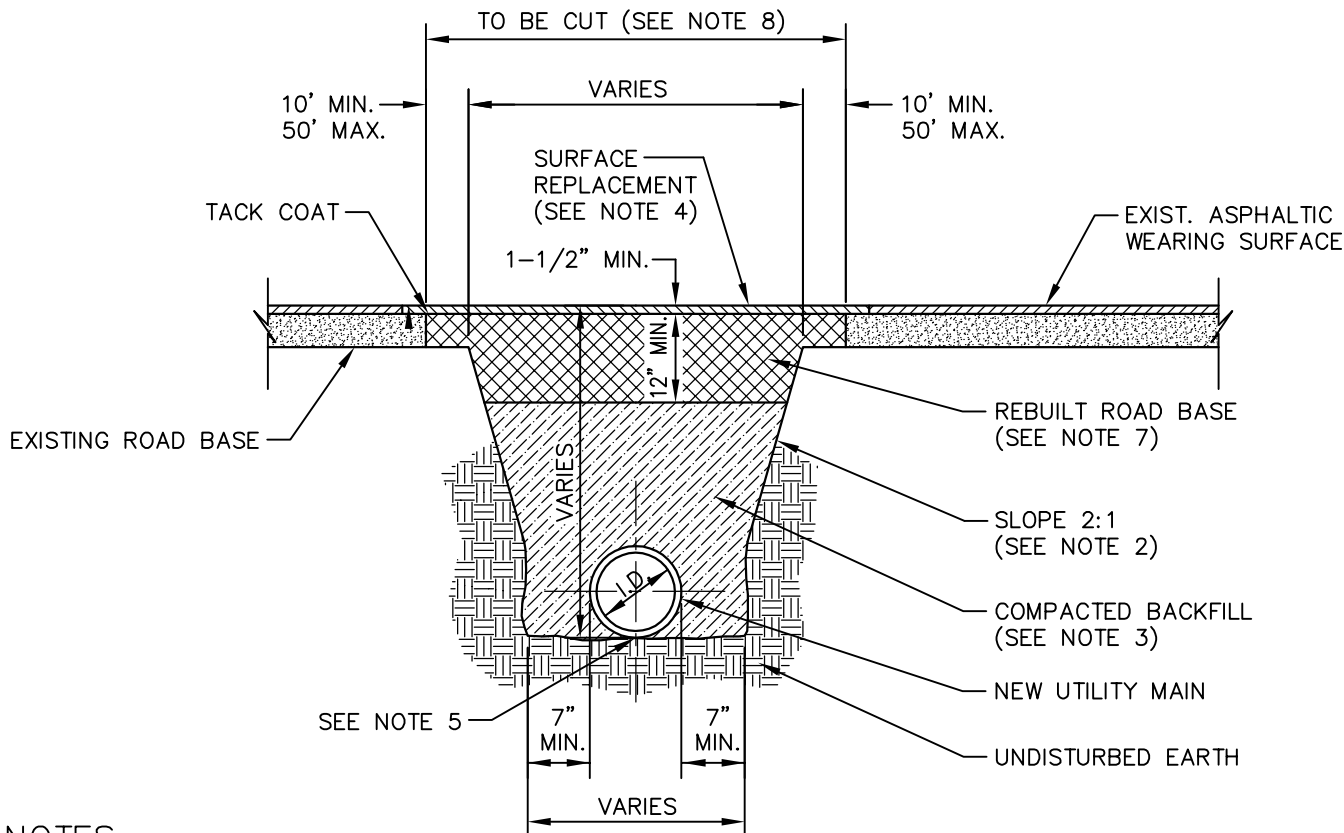
NOTES:

1. PIPE BEDDING: SELECT COMMON FILL COMPACTED TO 98% UNDER ROADS, CURB, GUTTER AND SHOULDERS; AND 95% IN ALL OTHER PLACES, OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST, AASHTO T-180.
2. TRENCH BACKFILL: COMMON FILL COMPACTED TO 98% UNDER ROADS, CURB, GUTTER AND SHOULDERS; AND 95% IN ALL OTHER PLACES, OF THE MAXIMUM DRY DENSITY AS DETERMINED BY THE MODIFIED PROCTOR COMPACTION TEST, AASHTO T-180.
3. PIPE BEDDING UTILIZING SELECT COMMON FILL OR BEDDING ROCK IN ACCORDANCE WITH TYPE 'A' BEDDING AND TRENCHING DETAIL, MAY BE REQUIRED – DIRECTED BY THE CITY OF MELBOURNE.
4. WATER SHALL NOT BE PERMITTED IN THE TRENCH DURING CONSTRUCTION.
5. ALL PIPE TO BE INSTALLED WITH BELL FACING UPSTREAM TO THE DIRECTION OF THE FLOW.
6. REFER TO SECTION OF THE MANUAL FOR SHEETING AND BRACING IN EXCAVATIONS
7. FINAL RESTORATION IN IMPROVED AREAS SHALL BE IN COMPLIANCE WITH ALL APPLICABLE REGULATIONS OF GOVERNING AGENCIES. SURFACE RESTORATION WITHIN THE RIGHT-OF-WAY SHALL COMPLY WITH REQUIREMENTS OF RIGHT-OF-WAY UTILIZATION REGULATIONS AND ROAD CONSTRUCTION SPECIFICATIONS.

SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS

UTILITY TRENCH DETAIL (TYP.)

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY:	L.A.M.	A-101



NOTES:

1. ASPHALT SHALL BE ASPHALTIC TYPE SP 9.5 FOR COMMERCIAL/INDUSTRIAL MINIMUM 1800 P.S.I.
2. A SLOPE OF 2:1 RATIO SHALL BE USED ONLY WHEN SOIL CONDITIONS DO NOT ALLOW VERTICAL TRENCHING.
3. COMPACTED BACKFILL MATERIAL SHALL BE FREE OF ASPHALT, LARGE ROCKS (3" DIA. MAX.), WOOD AND OTHER ORGANIC MATTER.
4. NEW ASPHALT SURFACE SHALL BE THE SAME THICKNESS AS EXISTING ASPHALT SURFACE (1.5" MINIMUM)
5. CONTRACTOR SHALL EXCAVATE BOTTOM OF TRENCH TO ALLOW FOR BELL SECTION OF PIPE.
6. BACKFILL SHALL BE COMPACTED BENEATH THE HAUNCHES OF THE PIPE USING MECHANICAL TAMPS. THIS COMPACTION APPLIES TO THE MATERIAL PLACED BENEATH THE HAUNCHES OF THE PIPE AND ABOVE ANY BEDDING REQUIRED. COMPACTION SHALL BE DONE IN 8" LAYERS. BACKFILL SHALL BE COMPACTED TO 98% MINIMUM DENSITY UNDER ROADS, CURB AND GUTTER AND SHOULDERS OR 95% MINIMUM DENSITY OUTSIDE ROAD R/W. MAXIMUM DENSITY SHALL BE AS DETERMINED BY THE STANDARD PROCTOR COMPACTION TEST AASHTO T-99.
7. REPLACED BASE MATERIAL OVER TRENCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE (12" MIN.)
8. ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED. SURFACE TREATED PAVEMENT JOINTS SHALL BE LAPPED AND FEATHERED.
9. BASE MATERIALS SHALL BE EITHER OF THE SAME TYPE AND COMPOSITION AS THE MATERIALS REMOVED OR EQUAL OR GREATER STRUCTURAL ADEQUACY. BASE MATERIAL IS TO BE COMPACTED IN 6" LIFTS.
10. REPLACEMENT OF EXISTING ASPHALT OR CONCRETE TO BE AN EVEN STRAIGHT CUT FROM THE WIDEST DAMAGED AREA.

SEE SPECIFICATIONS FOR ADDITIONAL INFORMATION AND REQUIREMENTS

OPEN ROADWAY CUT (TYP.)

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY:	L.A.M.	A-102
J.R.P.			

HORIZONTAL & VERTICAL MINIMUM SEPARATION REQUIREMENTS								
PROPOSED UTILITY	POTABLE WATER		RECLAIMED WATER NOTE 2		WASTEWATER (GRAVITY & FM)		STORM SEWER	
	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.	HORIZ.	VERT.
POTABLE WATER	N/A	N/A	3'	12"	6'/10' NOTE 3	12" NOTE 4	3'	12" NOTES 1 & 4
RECLAIMED WATER NOTE 2	3'	12"	N/A	N/A	3'	12"	3' NOTE 5	12" NOTE 1
WASTEWATER (GRAVITY & FM)	6'/10' NOTE 3	12" NOTE 4	3'	12"	N/A	N/A	3' NOTE 5	12" NOTE 1

SEPARATION REQUIREMENTS COMPLY WITH MINIMUM FDEP SEPARATION REQUIREMENTS OUTLINES IN 62-555.314, F.A.C. VARIANCES FROM THE FDEP REQUIREMENTS MUST COMPLY WITH 62-555.314, F.A.C., AND MUST BE APPROVED INDIVIDUALLY BY BOTH FDEP AND CITY OF MELBOURNE.

DISTANCES GIVEN ARE FROM OUTSIDE OF PIPE TO OUTSIDE OF PIPE.

NO WATER SHALL PASS THROUGH OR COME IN CONTACT WITH ANY PART OF SANITARY OR STORMWATER MANHOLE OR STRUCTURE.

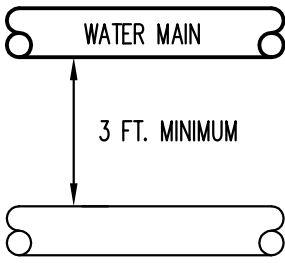
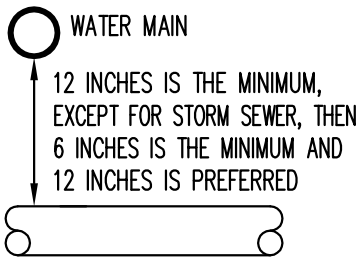
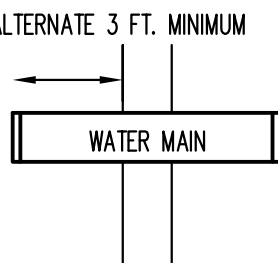
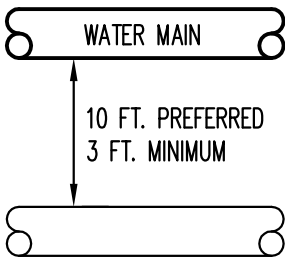
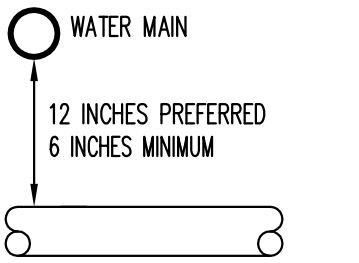
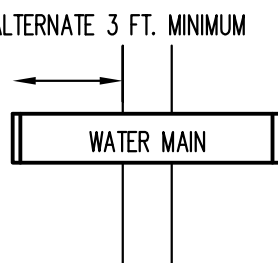
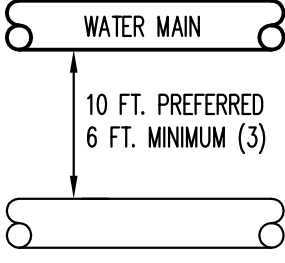
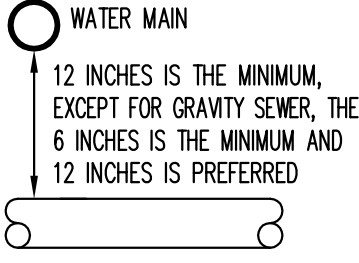
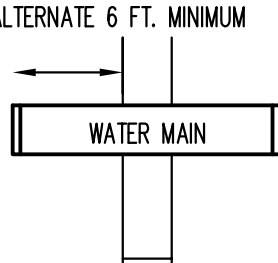
NOTES:

1. WHERE UTILITY PIPE CROSSES UNDER STORMWATER PIPE WITH LESS THAN 18 INCHES OF SEPARATION, STORMWATER PIPE SHALL BE SUPPORTED BY CONCRETE SADDLE.
2. FOR THE PURPOSE OF THIS TABLE AND SEPARATION REQUIREMENTS, RECLAIMED WATER SHALL MEAN UNRESTRICTED, PUBLIC ACCESS RECLAIMED WATER AS DEFINED BY PART III OF CHAPTER 62-610, F.A.C., ADDITIONAL SEPARATIONS SHALL APPLY FOR RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.
3. MINIMUM SEPARATION IS 6 FEET, AND PREFERABLY 10 FEET, BETWEEN POTABLE WATER AND WASTEWATER GRAVITY SEWER OR FORCE MAIN.
4. WHERE POTABLE WATER MAINS CROSS OVER WASTEWATER GRAVITY SEWER OR STORM SEWER, 6 INCH MINIMUM SEPARATION IS ACCEPTABLE, HOWEVER, 12 INCHES OF SEPARATION IS PREFERRED.
5. THIS SEPARATION REQUIREMENT IS FOR ACCESSIBILITY PURPOSES AND NOT A FDEP REQUIREMENT. VARIANCES FROM THESE PREFERRED SEPARATIONS MAY BE APPROVED BY THE CITY ON A CASE BY CASE BASIS.

UTILITY PIPE MINIMUM SEPARATION REQUIREMENTS TABLE

REV:	REV: BY	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE: N.T.S.
DATE: 7/1/16	JOB NO.:		DWG NO.: A-103
DRAWN BY: J.R.P.	DSGN. BY: L.A.M.		

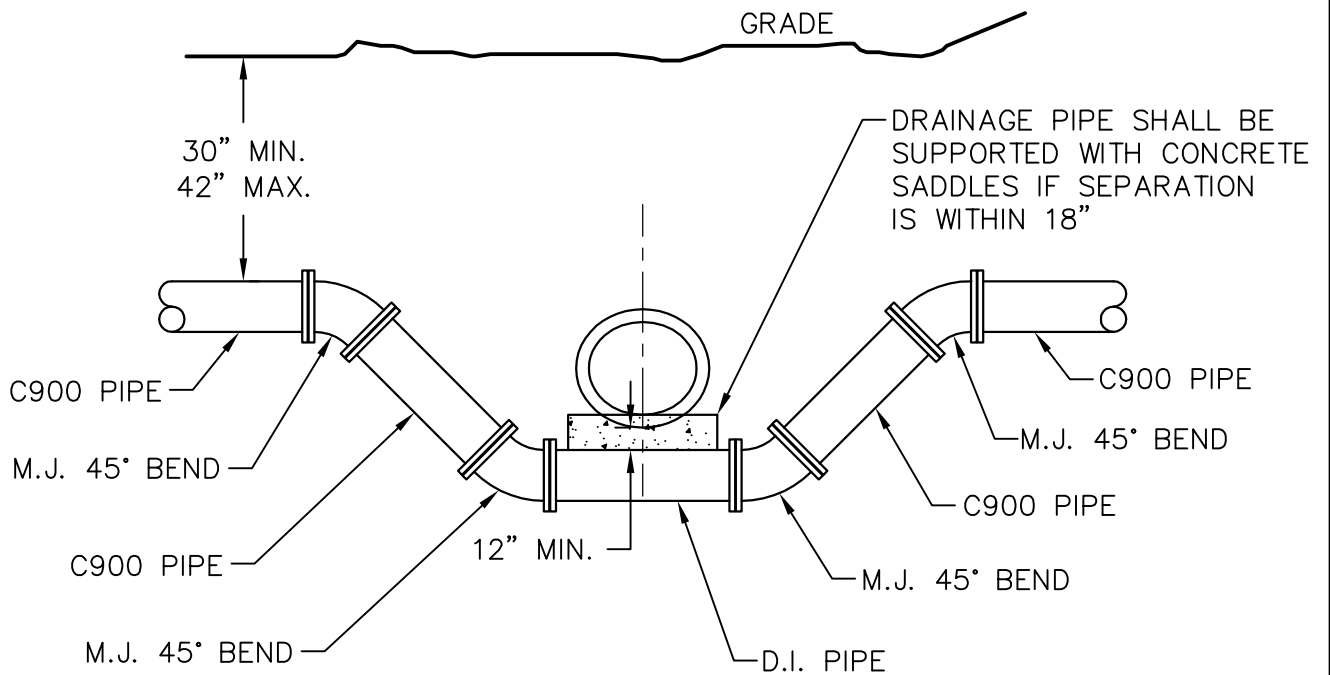
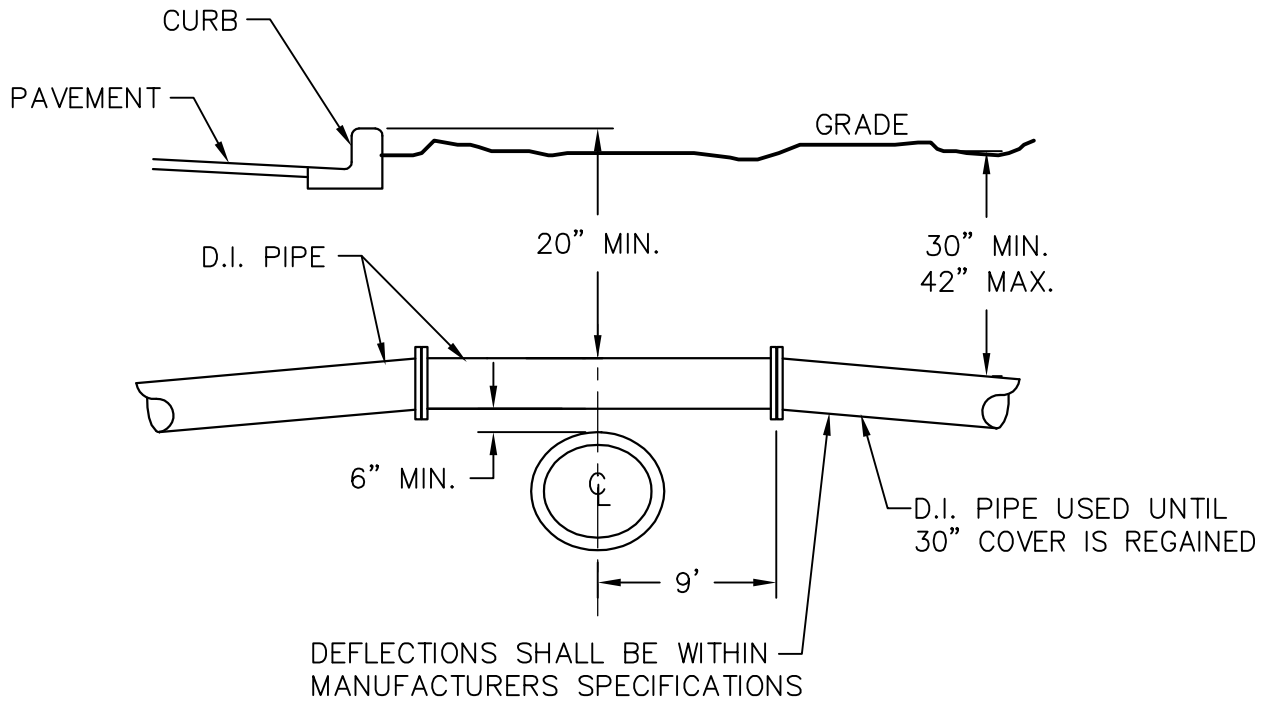
LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314

OTHER PIPE COMPONENT	HORIZONTAL SEPARATION	CROSSINGS (1)	JOINT SPACING @ CROSSINGS (FULL JOINT CENTERED)
STORM SEWER, STORMWATER FORCE MAIN, RECLAIMED WATER (2)	 <p style="text-align: center;">WATER MAIN</p> <p style="text-align: center;">3 FT. MINIMUM</p>	 <p style="text-align: center;">WATER MAIN</p> <p style="text-align: center;">12 INCHES IS THE MINIMUM, EXCEPT FOR STORM SEWER, THEN 6 INCHES IS THE MINIMUM AND 12 INCHES IS PREFERRED</p>	 <p style="text-align: center;">ALTERNATE 3 FT. MINIMUM</p> <p style="text-align: center;">WATER MAIN</p>
VACUUM SANITARY SEWER	 <p style="text-align: center;">WATER MAIN</p> <p style="text-align: center;">10 FT. PREFERRED 3 FT. MINIMUM</p>	 <p style="text-align: center;">WATER MAIN</p> <p style="text-align: center;">12 INCHES PREFERRED 6 INCHES MINIMUM</p>	 <p style="text-align: center;">ALTERNATE 3 FT. MINIMUM</p> <p style="text-align: center;">WATER MAIN</p>
GRAVITY OR PRESSURE SANITARY SEWER, SANITARY SEWER FORCE MAIN RECLAIMED WATER (4)	 <p style="text-align: center;">WATER MAIN</p> <p style="text-align: center;">10 FT. PREFERRED 6 FT. MINIMUM (3)</p>	 <p style="text-align: center;">WATER MAIN</p> <p style="text-align: center;">12 INCHES IS THE MINIMUM, EXCEPT FOR GRAVITY SEWER, THEN 6 INCHES IS THE MINIMUM AND 12 INCHES IS PREFERRED</p>	 <p style="text-align: center;">ALTERNATE 6 FT. MINIMUM</p> <p style="text-align: center;">WATER MAIN</p>
ON-SITE SEWAGE TREATMENT AND DISPOSAL SYSTEM	10 FT. MINIMUM	---	---

- (1) WATER MAIN SHOULD CROSS ABOVE OTHER PIPE. WHEN WATER MAIN MUST BE BELOW OTHER PIPE, THE MINIMUM SEPARATION IS 12 INCHES.
- (2) RECLAIMED WATER REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.
- (3) 3 FT. FOR GRAVITY SANITARY SEWER WHERE THE BOTTOM OF THE WATER MAIN IS LAID AT LEAST 6 INCHES ABOVE THE TOP OF THE GRAVITY SANITARY SEWER
- (4) RECLAIMED WATER NOT REGULATED UNDER PART III OF CHAPTER 62-610, F.A.C.

UTILITY PIPE MINIMUM SEPARATION REQUIREMENTS FIGURE

REV:	REV. BY:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:	N.T.S.
DATE:	JOB NO.:		DWG NO.:	A-104
DRAWN BY:	DSGN. BY:			
J.R.P.	L.A.M.			

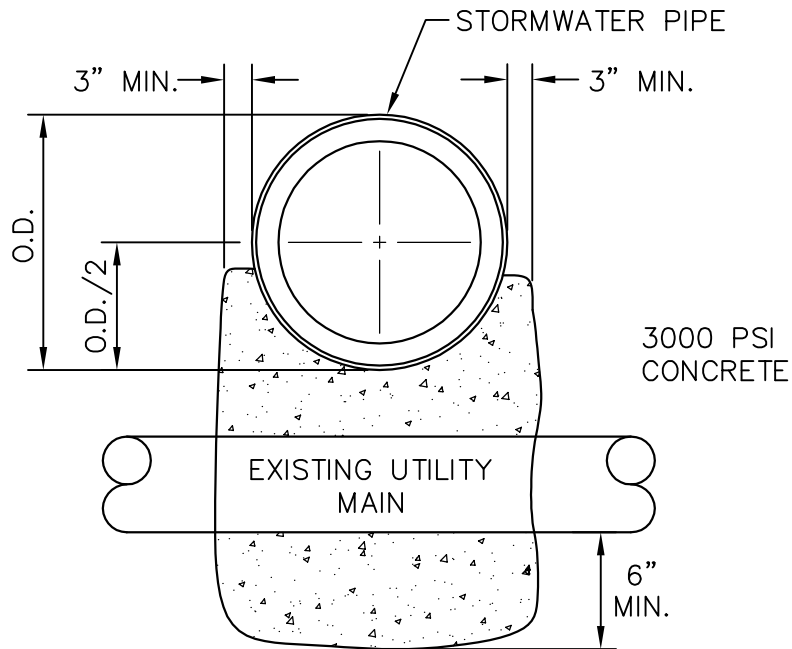


NOTE:

ALL JOINTS MECHANICALLY RESTRAINED

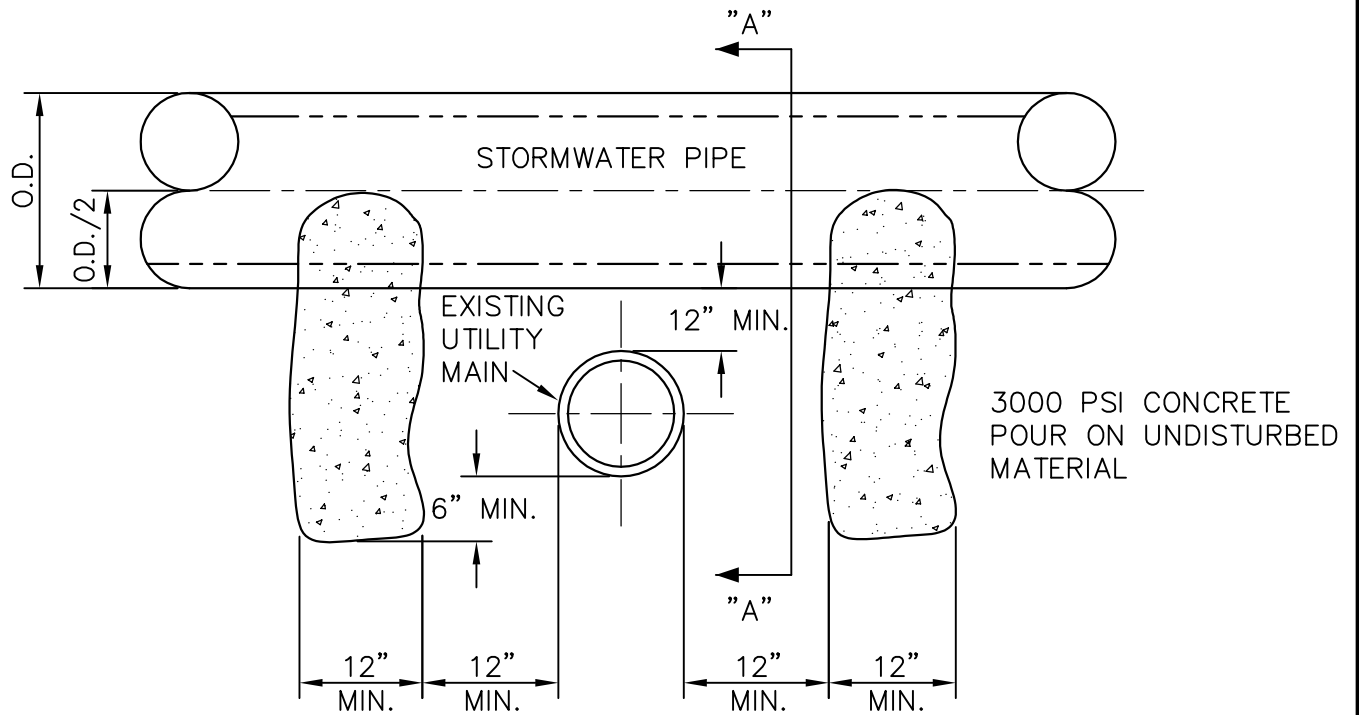
UTILITY CROSSINGS

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY:		A-105
J.R.P.	L.A.M.		



CONCRETE SADDLE WILL BE USED IN ALL CASES WHERE PROPOSED PIPE OVERLAY IS WITHIN 18" OF EXISTING UTILITY MAIN.

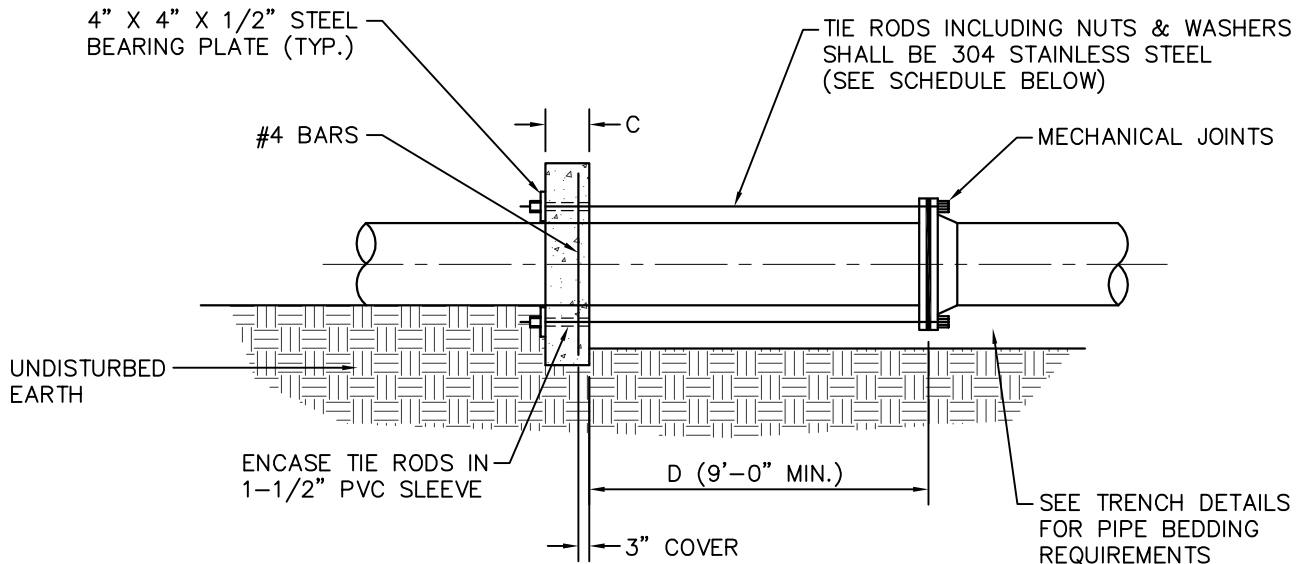
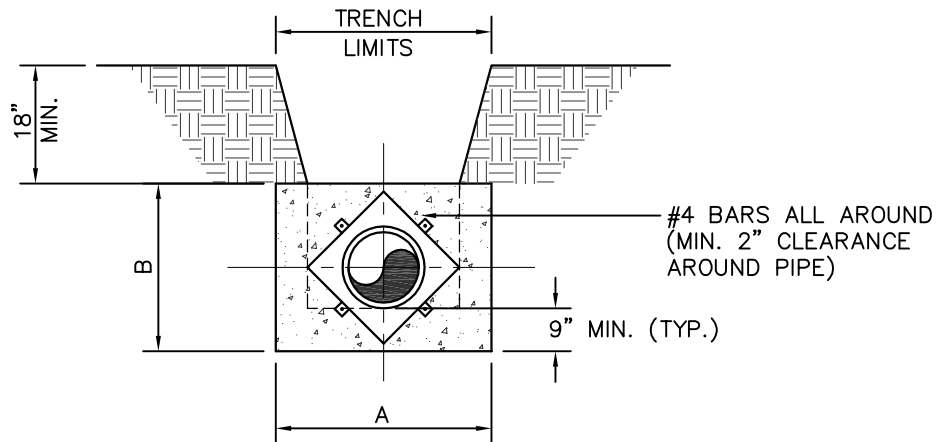
SECTION "A"



CONCRETE SADDLE SHALL NOT COME IN CONTACT WITH UTILITY MAIN.

TYPICAL CONCRETE SADDLE DETAIL

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY:	L.A.M.	A-106
J.R.P.			



NOTES:

1. ADDITIONAL REINFORCEMENTS SHALL BE SPECIFIED BY THE ENGINEER.
2. MINIMUM COMPRESSIVE STRENGTH FOR CONCRETE SHALL BE 3000 PSI.
3. BEDDING, BACKFILL AND COMPACTION SHALL BE SPECIFIED IN THE STANDARD DRAWING.
4. ALL FORM BOARDS SHALL BE REMOVED PRIOR TO BACKFILLING.
5. NO ALLOWANCE SHALL BE MADE FOR FRICTION BETWEEN THE PIPE WALL.
6. DESIGN PRESSURE: 150 PSI.
7. REQUIRED FOR LINE STOP OPERATIONS WHERE APPLICABLE.

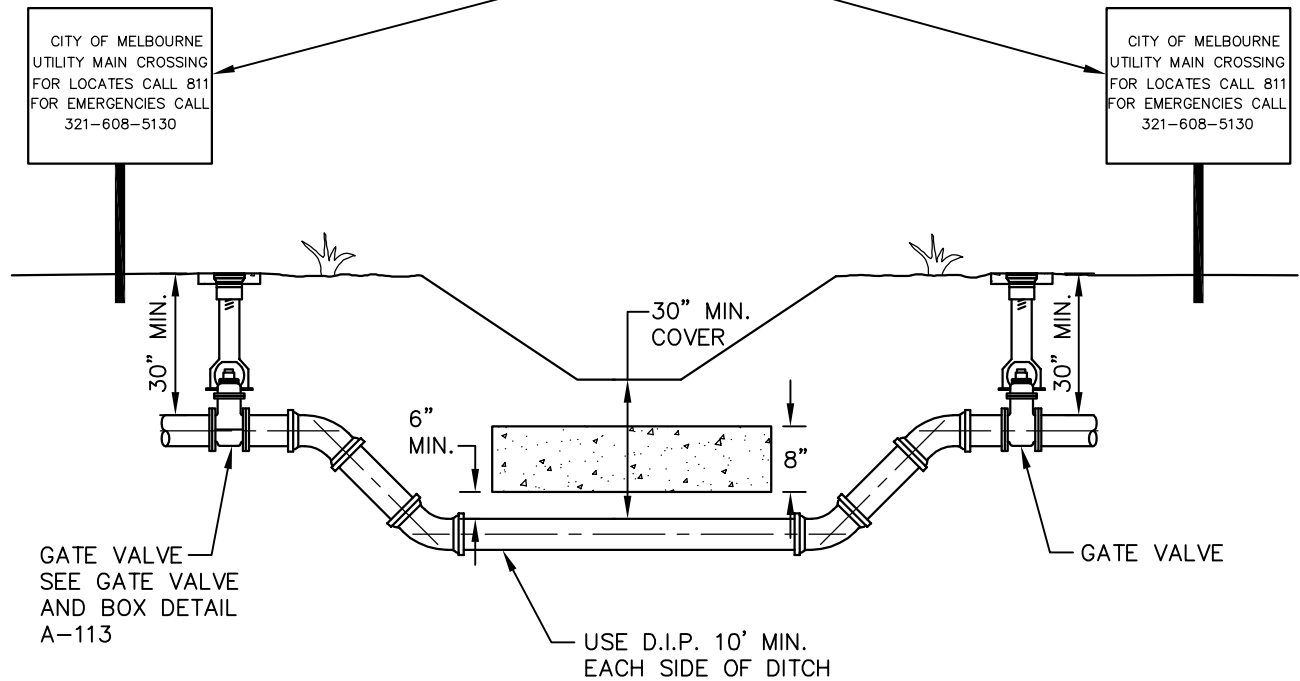
SCHEDULE OF DIMENSIONS AND MATERIALS						
PIPE SIZE (INCHES)	DIMENSIONS (FT.)				TIE RODS REQ'D	
	A	B	C	D	DIA.	NO.
6	2.0	2.0	1.0		3/4	2
8	2.5	2.5	1.0		3/4	2
10	3.5	3.0	1.0		3/4	2
12	5.0	3.0	1.0		3/4	2
16	6.0	4.0	1.5		3/4	4
20	8.0	5.0	1.5		3/4	6
24	9.0	6.0	1.5		3/4	8

NOTE: THRUST COLLAR AREAS TO BE COMPUTED ON BASIS OF 2000 LBS/SF SOIL RESTRAINT BEARING.

THRUST COLLAR DETAIL

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION		SCALE:	N.T.S.
DATE:	JOB NO.:			DWG NO.:	A-107
DRAWN BY:	DSGN. BY:				
7/1/16	L.A.M.				

24" x 18" SIGN, WHITE BACKGROUND
WITH 2" BLACK LETTERS (SEE NOTE 4)

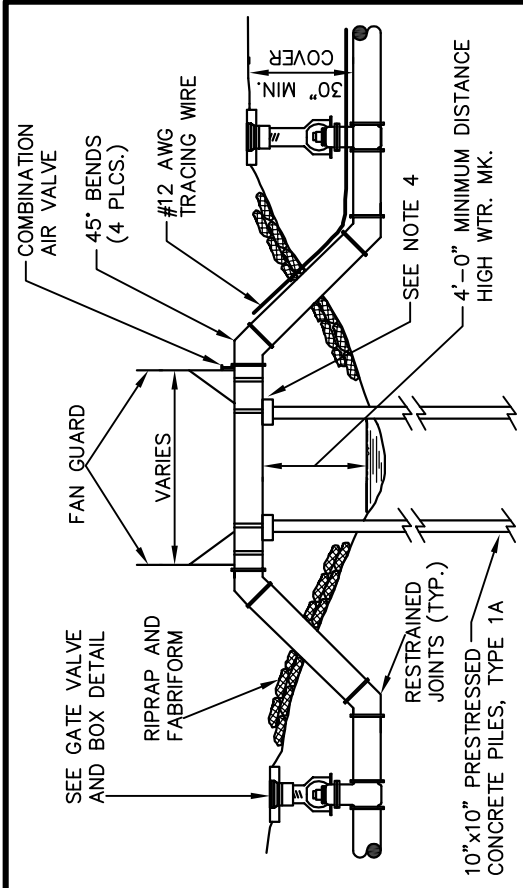


NOTES:

1. MAIN SHALL BE INSTALLED WITH MINIMUM NUMBER OF MECHANICALLY RESTRAINED JOINTS WITHIN THE CANAL OR DITCH. ALL JOINTS WITHIN THE CANAL OR DITCH SHALL BE RESTRAINED.
2. CONCRETE SLAB SHALL BE 2" WIDER THAN THE PIPE O.D.
3. CONCRETE IS REQUIRED WHEN COVER IS LESS THAN 36".
4. FOR WASTEWATER CROSSINGS, DEPTH OF PIPE SHALL BE NOTED ON SIGNAGE IN ACCORDANCE WITH 62-604.400 F.A.C..

DITCH CROSSINGS

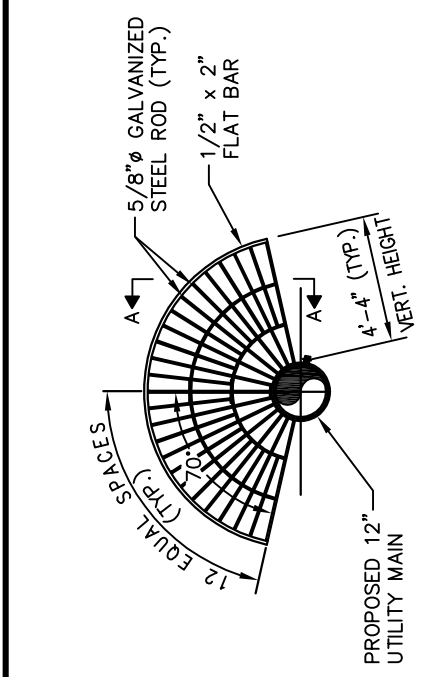
REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
DRAWN BY:	DSGN. BY		DWG NO.:
7/1/16	L.A.M.	A-108	



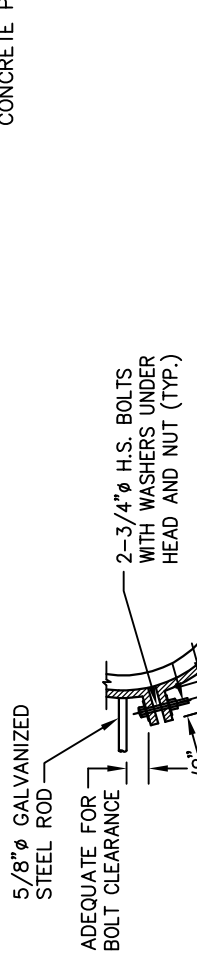
CROSSING NOTES:

1. ALL PIPES SHALL BE DUCTILE IRON WITH STAINLESS STEEL HARDWARE.
2. ALL EXPOSED PIPING SHALL BE SAND BLASTED, PRIMED AND PAINTED COLOR CODING ACCORDING TO UTILITY. SEE APPROVED PRODUCTS LIST.
3. PROVISIONS SHALL BE MADE FOR EXPANSION OF ASSEMBLY A SUPPORTED MECHANICAL JOINT OR APPROVED EQUAL.
4. TIE PIPE TO PIERS WITH STAINLESS STEEL STRAPS AND HARDWARE.
5. CONCRETE PILES PLACEMENT WILL BE DESIGNED BY A STRUCTURAL ENGINEER.

AERIAL CROSSING



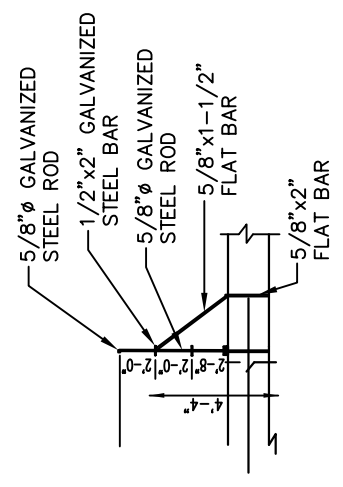
PIPE BARRICADE



BARRICADE NOTES:

1. ANY ALTERNATE DESIGNS MUST BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
2. ALL STEEL TO BE HOT DIPPED GALVANIZED AFTER FABRICATION.
3. ALL BOLTS, NUTS AND WASHERS TO BE MIN. 304 STAINLESS STEEL.
4. TWO PIPE BARRICADES ARE REQ'D. (ONE ON EACH END) EXACT LOCATION TO BE DETERMINED BY ENGINEER.
5. BARRICADE IS LOCATED PERPENDICULAR TO PIPE.

TIE DOWN



SECTION A-A

PERSONNEL BARRICADE-FAN GUARD

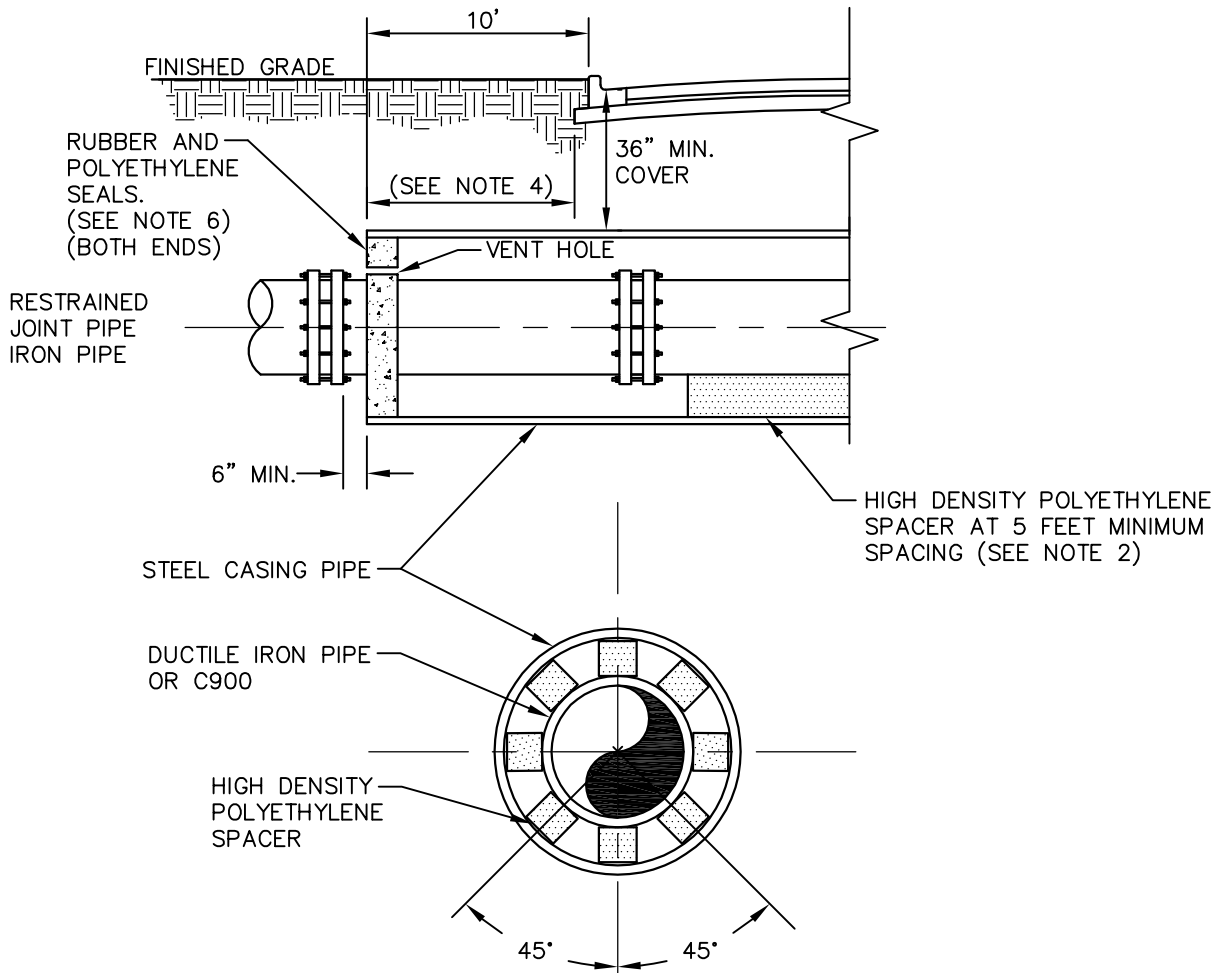
NOT TO SCALE

AERIAL PIPE CROSSING AND BARRICADE

REV:	REV:
DATE: 7/1/16	BY:
DRAWN BY: J.R.P.	DSGN. BY: L.A.M.

**CITY OF MELBOURNE
UTILITIES ADMINISTRATION**

SCALE:	N.T.S.
DWG NO.:	A-109



NOTES:

1. WHEN CONSTRUCTION IS WITHIN FDOT JURISDICTION, ADDITIONAL REQUIREMENTS OF THE UTILITY ACCOMMODATION MANUAL SHALL BE MET.
2. UTILITY MAINS SHALL BE PUSHED/PULLED THROUGH THE CASING ON HIGH DENSITY POLYETHYLENE CASING SPACERS, PLACED AT 5 FOOT INTERVALS.
3. ALL PIPE JOINTS IN CASING SHALL BE REATRINED.
4. CASING SHALL EXTEND 10' BEYOND EDGE OF PAVEMENT. THE CITY MAY REQUIRE LONGER CASING FOR DEEPER BORES.
5. CASING SPACERS SHALL BE ALL STAINLESS STEEL WITH HIGH DENSITY POLYETHYLENE RUNNERS.
6. ALL CASING ENDS SHALL BE SEALED WITH THE APPROPRIATE RUBBER SEALS SECURED BY STAINLESS STEEL STRAPS. CASING END SEALS SHALL BE OF THE SAME MANUFACTURER AS THE CASING SPACERS.

JACK AND BORE DETAIL

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
DRAWN BY:	DSGN. BY:		DWG NO.:
7/1/16	L.A.M.	A-110	

MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)

FITTINGS	PIPE SIZE								
	6"	8"	10"	12"	16"	20"	24"	30"	36"
90° BEND	44(51)	57(66)	68(78)	78(92)	99(116)	119(137)	137(158)	161(185)	183(210)
45° BEND	18(21)	24(29)	29(33)	33(38)	42(48)	50(57)	57(66)	66(77)	77(87)
22.5° BEND	9(11)	12(14)	14(17)	17(18)	21(24)	24(29)	27(32)	33(38)	38(42)
11.25° BEND	5(6)	6(8)	8(9)	9(9)	11(12)	12(14)	14(17)	17(20)	18(21)
BRANCH OF TEE	42(59)	69(99)	92(131)	116(165)	161(230)	204(291)	245(348)	300(428)	353(503)
DEAD END	92(131)	120(171)	143(204)	168(239)	213(305)	257(366)	299(425)	354(507)	408(582)

NOTES:

1. ALL FITTINGS SHALL BE RESTRAINED JOINT TYPE UNLESS OTHERWISE INDICATED.
2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO, OR GREATER THAN THE LENGTH SHOWN IN THE TABLE.
3. WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS, GREATEST LENGTH OF RESTRAINED PIPE.
4. IN-LINE VALVES OUTSIDE THE LIMITS OF RESTRAINED JOINTS FROM OTHER FITTINGS, NEED NOT BE RESTRAINED UNLESS OTHERWISE INDICATED.
5. LENGTH OF RESTRAINED JOINT PIPING FOR REDUCERS, REDUCING TEES, AND VERTICAL POSITION FITTINGS SHALL BE DESIGNED ON AN INDIVIDUAL BASIS, WITH DESIGN CALCULATIONS FOR EACH BEING SUBMITTED FOR REVIEW.
6. LENGTHS SHOWN IN THE TABLE HAVE BEEN CALCULATED IN ACCORDANCE WITH THE PROCEDURE OUTLINED IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" AS PUBLISHED BY DIPRA, WITH THE FOLLOWING ASSUMPTIONS:

WORKING PRESSURE: 70 P.S.I.
 DESIGN PRESSURE: 150 P.S.I.
 SOIL DESIGNATION: SAND-SILT
 LAYING CONDITION: TYPE 2
7. FOR PIPE ENCASED IN POLYETHYLENE, USE VALUES GIVEN IN PARENTHESES, OR INCREASE THE GIVEN VALUE BY A FACTOR OF 1.2
8. WHERE INTERNAL RESTRAINED JOINTS ARE USED, ENTIRE BELL SHALL BE PAINTED RED.

RESTRAINED PIPE TABLE – POTABLE AND RECLAIMED (150 psi)

REV:	REV: BY	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE: N.T.S.
DATE: 7/1/16	JOB NO.:		DWG NO.: A-111
DRAWN BY: J.R.P.	DSCN. BY: L.A.M.		

MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)

FITTINGS	PIPE SIZE								
	6"	8"	10"	12"	16"	20"	24"	30"	36"
90° BEND	29(34)	38(44)	45(52)	52(61)	66(77)	70(91)	91(105)	107(123)	122(140)
45° BEND	12(14)	16(19)	19(22)	22(25)	28(32)	33(38)	38(44)	44(51)	51(58)
22.5° BEND	6(7)	8(9)	9(11)	11(12)	14(16)	16(19)	18(21)	22(25)	25(28)
11.25° BEND	3(4)	4(5)	5(6)	6(6)	7(8)	8(9)	9(11)	11(13)	12(14)
BRANCH OF TEE	28(39)	46(66)	61(87)	77(110)	107(153)	136(194)	163(232)	200(285)	235(335)
DEAD END	61(87)	80(114)	95(136)	112(159)	142(203)	171(244)	199(283)	236(338)	272(388)

NOTES:

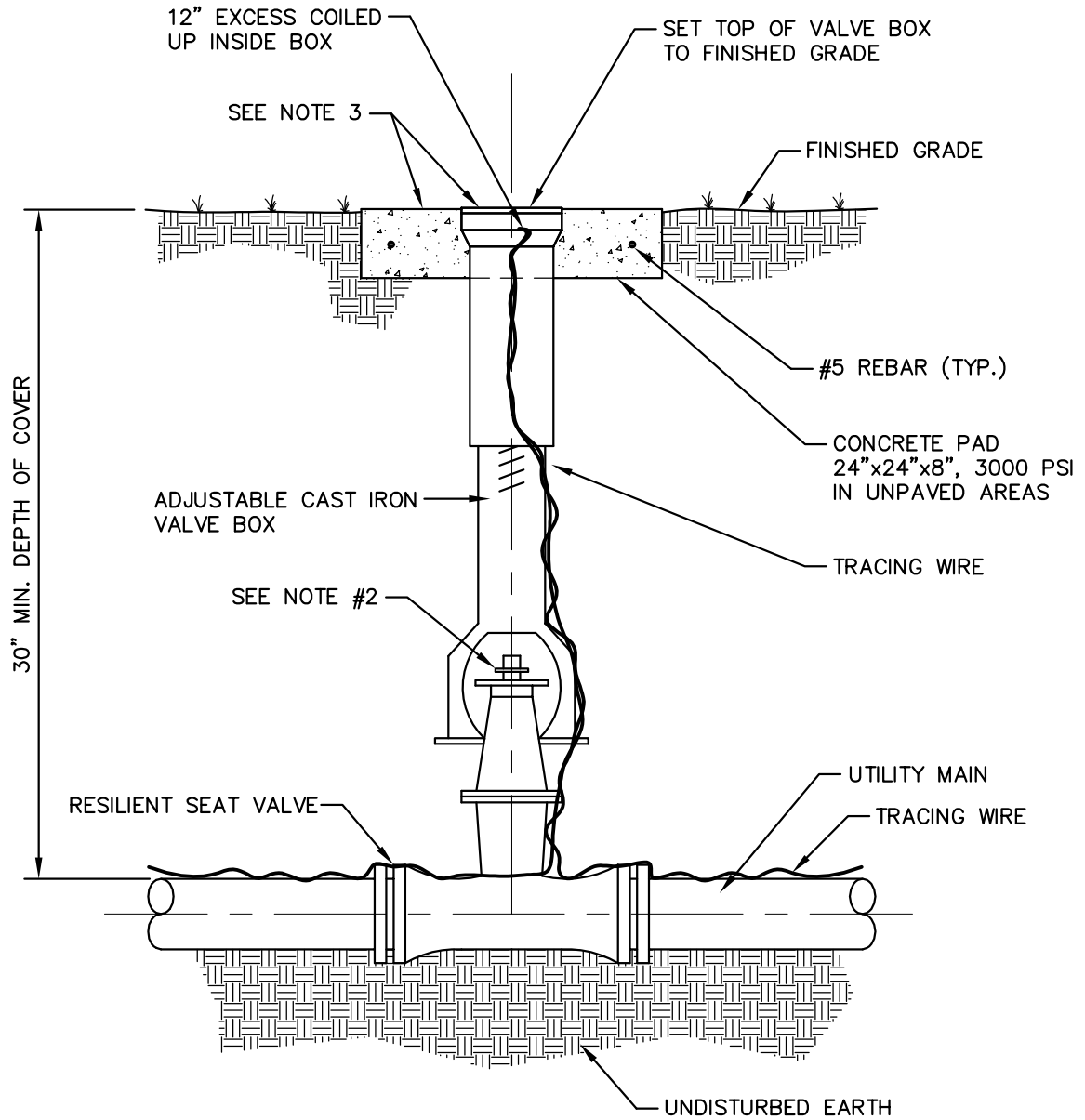
1. ALL FITTINGS SHALL BE RESTRAINED JOINT TYPE UNLESS OTHERWISE INDICATED.
2. INSTALL FULL LENGTH JOINTS WITH TOTAL LENGTH EQUAL TO, OR GREATER THAN THE LENGTH SHOWN IN THE TABLE.
3. WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS, GREATEST LENGTH OF RESTRAINED PIPE.
4. IN-LINE VALVES OUTSIDE THE LIMITS OF RESTRAINED JOINTS FROM OTHER FITTINGS, NEED NOT BE RESTRAINED UNLESS OTHERWISE INDICATED.
5. LENGTH OF RESTRAINED JOINT PIPING FOR REDUCERS, REDUCING TEES, AND VERTICAL POSITION FITTINGS SHALL BE DESIGNED ON AN INDIVIDUAL BASIS, WITH DESIGN CALCULATIONS FOR EACH BEING SUBMITTED FOR REVIEW.
6. LENGTHS SHOWN IN THE TABLE HAVE BEEN CALCULATED IN ACCORDANCE WITH THE PROCEDURE OUTLINED IN "THRUST RESTRAINT DESIGN FOR DUCTILE IRON PIPE" AS PUBLISHED BY DIPRA, WITH THE FOLLOWING ASSUMPTIONS:

WORKING PRESSURE: 100 P.S.I.
 SOIL DESIGNATION: SAND-SILT
 LAYING CONDITION: TYPE 2
 SAFETY FACTOR: 1.5

7. FOR PIPE ENCASED IN POLYETHYLENE, USE VALUES GIVEN IN PARENTHESES, OR INCREASE THE GIVEN VALUE BY A FACTOR OF 1.2

RESTRAINED PIPE TABLE – WASTEWATER FORCE MAIN (100 psi)

REV:	REV: BY	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:	N.T.S.
DATE:	JOB NO.:		DWG NO.:	A-112
DRAWN BY:	DSCN. BY			
J.R.P.	L.A.M.			



PROFILE

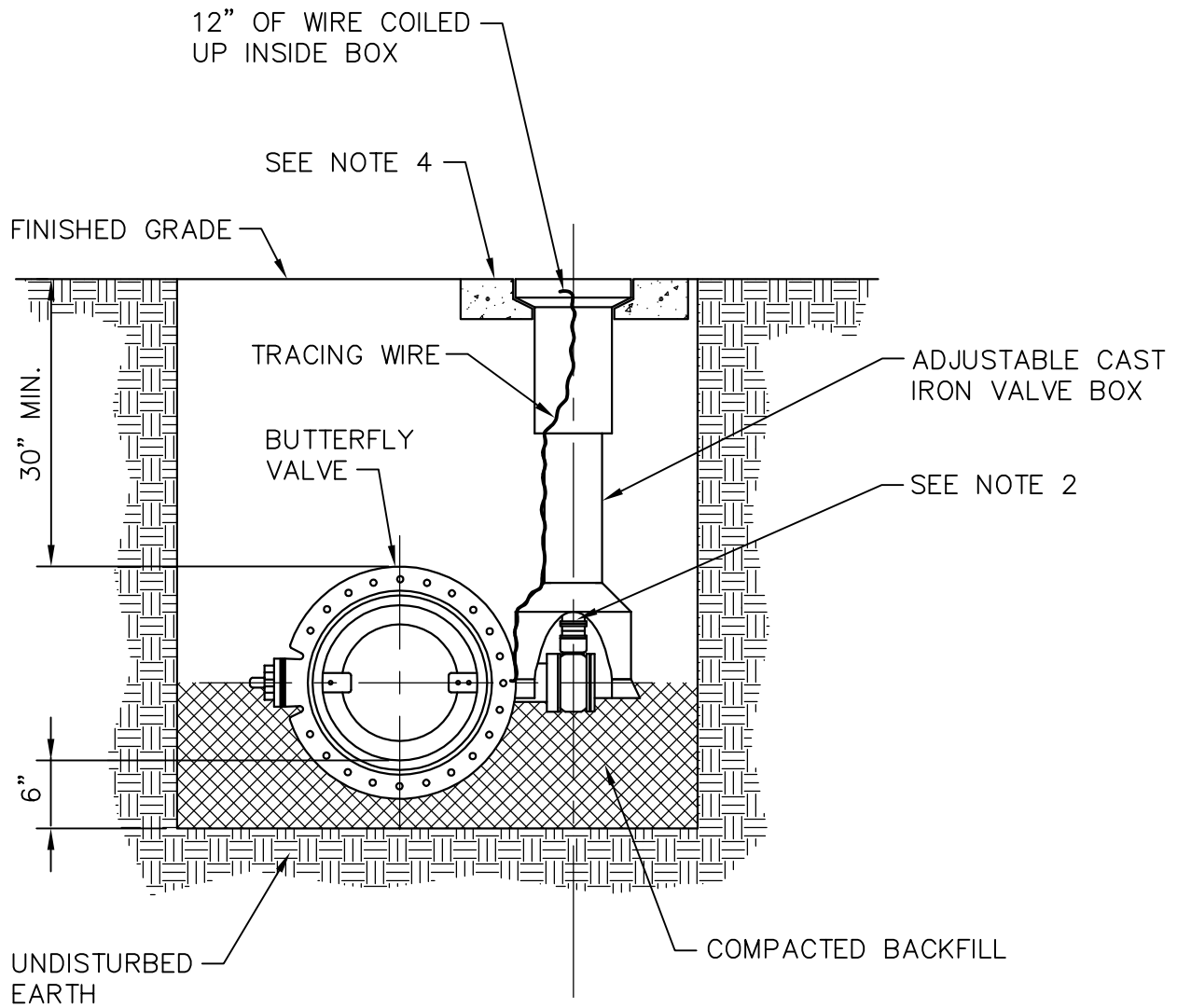
NOT TO SCALE

NOTES:

1. FIELD MANUFACTURED VALVE BOX EXTENSIONS NOT PERMITTED. CITY SHALL GIVE APPROVAL FOR FIELD EXTENSION ONLY WHEN VALVE DEPTH EXCEEDS VALVE BOX HEIGHTS OBTAINABLE THROUGH MANUFACTURERS LISTED IN APL.
2. VALVE NUT EXTENSIONS SHALL BE INSTALLED ON VALVE NUTS DEEPER THAN 48 INCHES FROM FINISH GRADE. EXTENSION SHALL BE INSTALLED SO OPERATING NUT IS 12 TO 20 INCHES BELOW FINISH GRADE.
3. FOR VALVE BOX LID AND CONCRETE PAD DETAIL, SEE A-115
4. SIDE ACTUATED GATE VALVES MAY BE REQUIRED WHERE DEPTH REQUIREMENTS DICTATE.

GATE VALVE AND BOX DETAIL

REV:	REV:		
DATE:	BY:		SCALE:
7/1/16	JOB NO.:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	N.T.S.
DRAWN BY:	DSGN. BY:		DWG NO.:
J.R.P.	L.A.M.		A-113



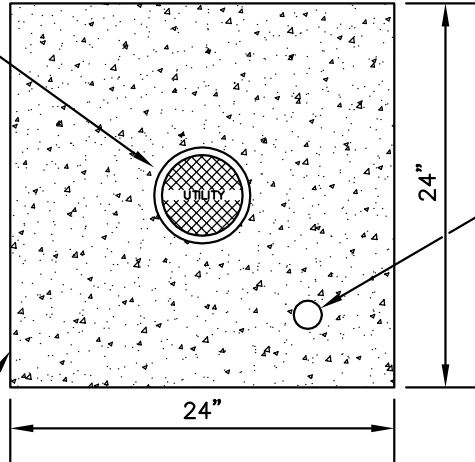
NOTES:

1. PVC EXTENSIONS SHALL NOT BE USED ON VALVE BOX EXTENSIONS
2. THE ACTUATING NUT FOR DEEPER VALVES SHALL BE EXTENDED TO COME UP TO 4 FOOT DEPTH BELOW FINISHED GRADE.
3. ALL WATER SHUT-OFF VALVES (30") INCHES AND LARGER SHALL BE BUTTERFLY VALVES.
4. FOR VALVE BOX LID AND CONCRETE PAD DETAIL, SEE A-115

BUTTERFLY VALVE AND BOX DETAIL

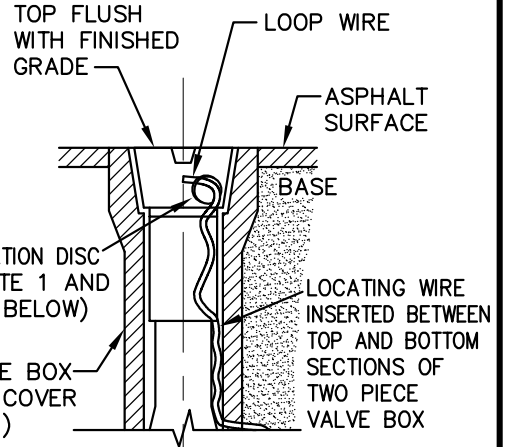
REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
DRAWN BY:	DSGN. BY:		DWG NO.:
7/1/16	L.A.M.	A-114	

VALVE BOX LID
(SEE NOTE 2)



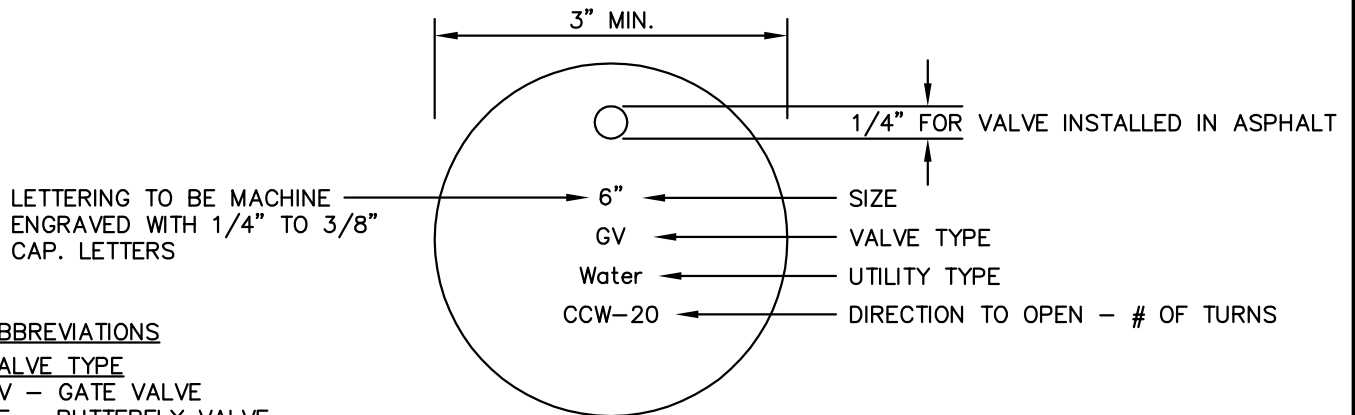
8" THICK 3,000 PSI
(MIN.) CONCRETE WITH
#5 REBAR CONTINUOUS
(SEE NOTE 2)

OUTSIDE PAVEMENT
NOT TO SCALE



DISC TO BE HANGING IN THE BOX
ANCHORED TO THE LOCATING WIRE

INSIDE PAVEMENT
NOT TO SCALE



LETTERING TO BE MACHINE
ENGRAVED WITH 1/4" TO 3/8"
CAP. LETTERS

IDENTIFICATION DISC
EXAMPLE

ABBREVIATIONS

VALVE TYPE

- GV - GATE VALVE
- BF - BUTTERFLY VALVE
- PV - PLUG VALVE
- SA - SIDE ACTUATED

UTILITY TYPE

- WATER - POTABLE WATER
- RW - RECLAIMED WATER
- SEWER - WASTEWATER COLLECTION

DIRECTION TO OPEN

- CCW - COUNTER CLOCKWISE
- CW - CLOCKWISE

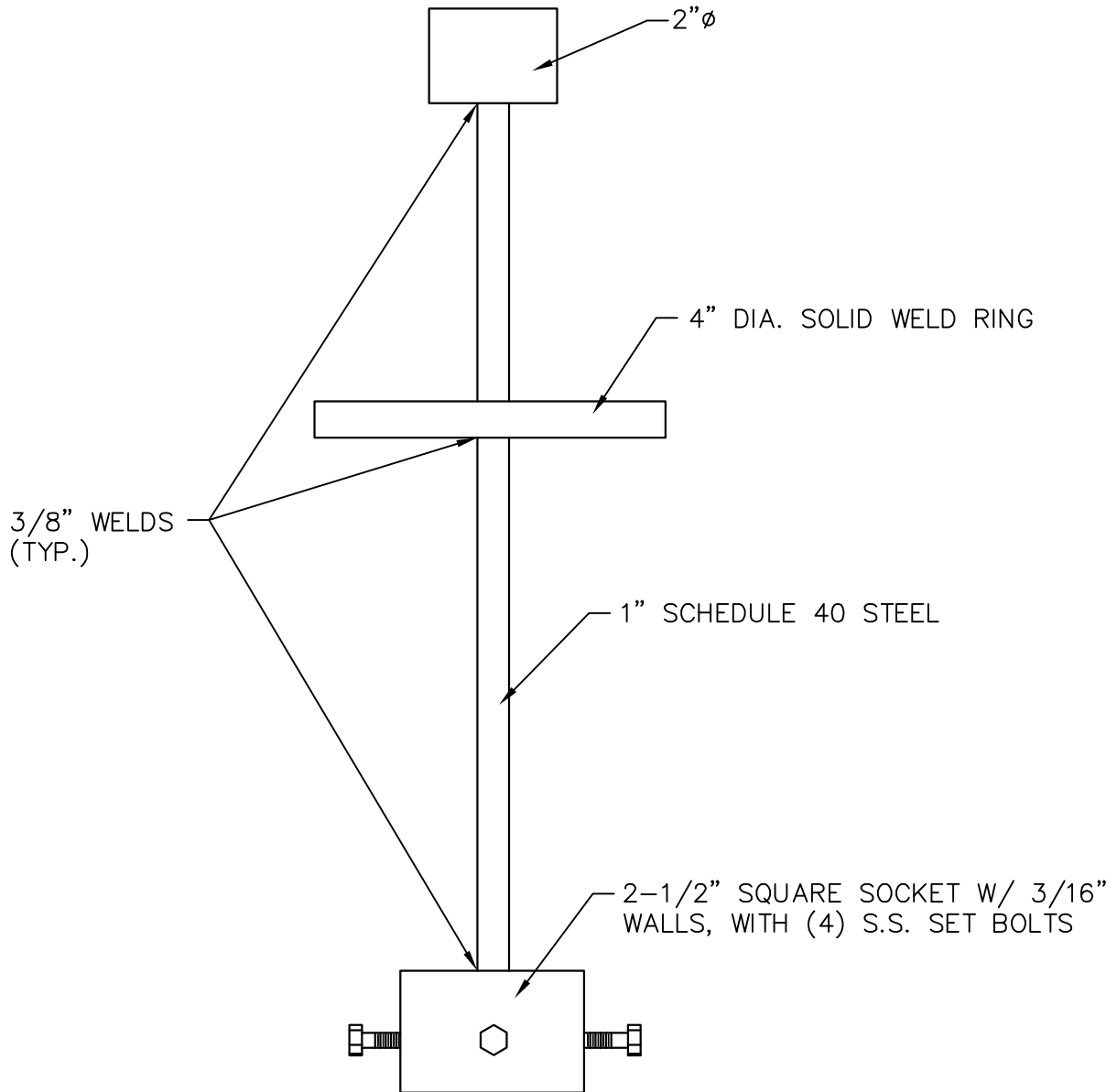
NOTES:

1. BRONZE (OR STAINLESS STEEL) IDENTIFICATION DISC SHALL BE REQUIRED FOR ALL VALVES, EXCEPT HYDRANT VALVES.
2. FOR POTABLE WATER SYSTEMS, VALVE BOX LID STAMPED "WATER" AND PAINTED BLUE. FOR RECLAIMED WATER SYSTEMS, VALVE BOX LID STAMPED "REUSE" AND PAINTED PURPLE. FOR WASTEWATER COLLECTION SYSTEMS, VALVE BOX LID STAMPED "SEWER" AND PAINTED GREEN. SEE APPENDIX B - APPROVED PRODUCTS LIST FOR PAINT SPECIFICATIONS.

VALVE BOX LID, PAD AND MARKER

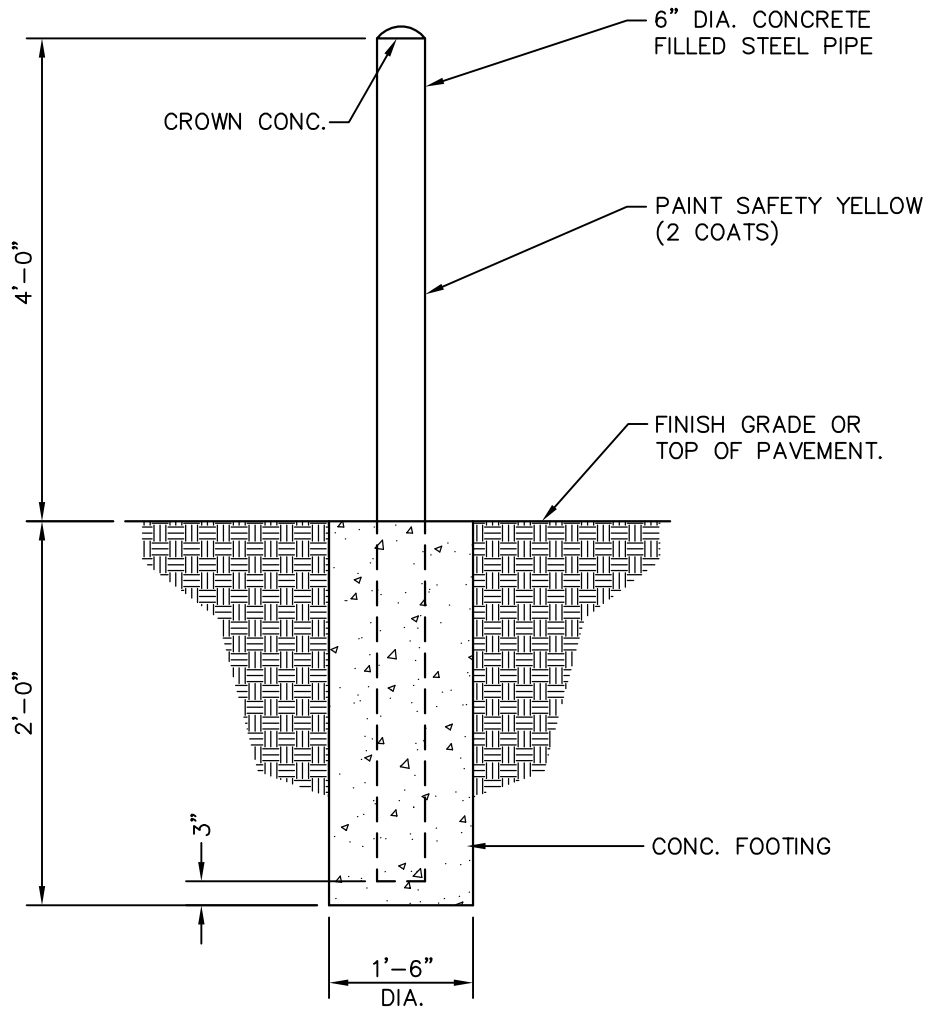
REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
DRAWN BY:	DSGN. BY:		DWG NO.:
7/1/16	L.A.M.	A-115	

VALVE EXTENSION



VALVE EXTENSION

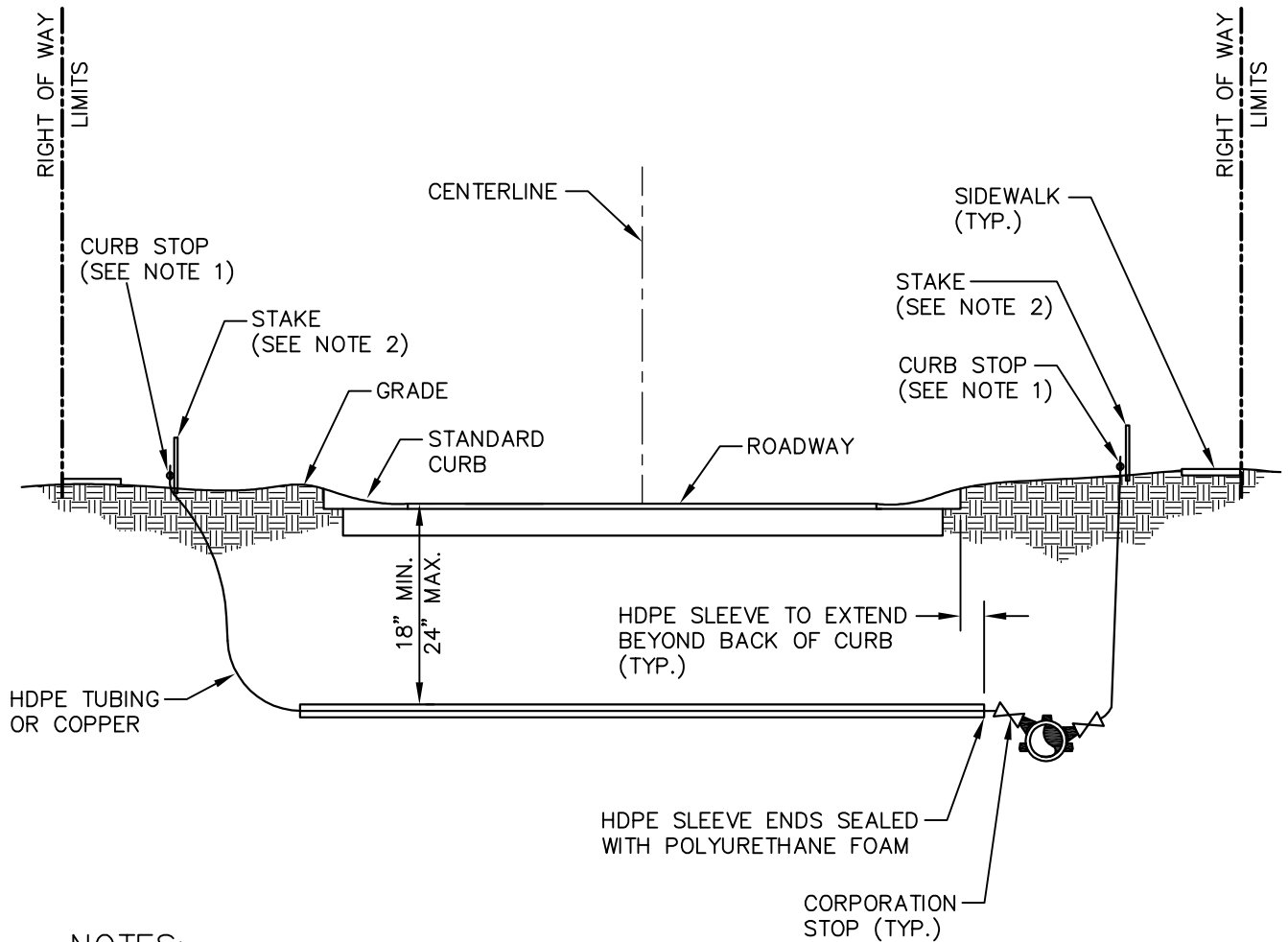
REV:	REV:		
DATE:	BY:		
7/1/16	JOB NO.:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE: N.T.S.
DRAWN BY: J.R.P.	DSGN. BY: L.A.M.		DWG NO. A-116



NOTE: USE 3,000 PSI (MIN.) CONCRETE

BOLLARD DETAIL

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY		A-117
J.R.P.	L.A.M.		



NOTES:

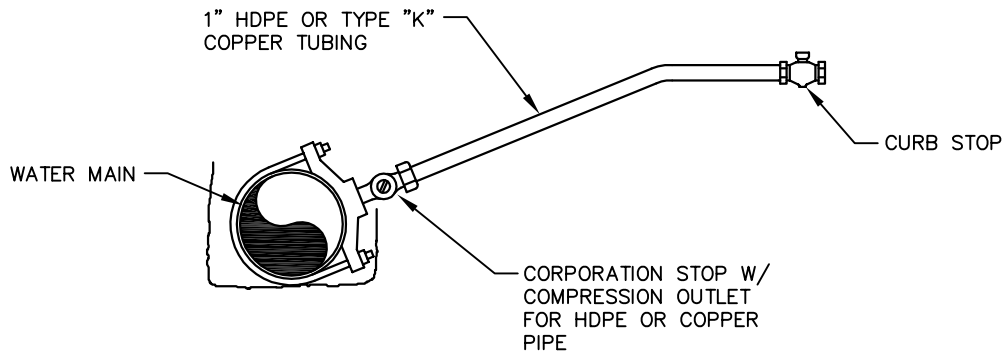
1. CURB STOP SHALL BE INSTALLED ON STREET SIDE OF THE SIDEWALK BETWEEN SIDEWALK AND CURB.
2. TEMPORARY MARKING OF SERVICE – ALL SERVICE LINE CURB STOP TERMINATIONS SHALL BE EXPOSED TO VIEW PRIOR TO AND DURING PRE-FINAL AND FINAL INSPECTION. SERVICE LINE SHALL BE ATTACHED BY MEANS OF TAPE TO A 2 INCH x 1 INCH (MINIMUM 24 INCH IN LENGTH) STAKE WITH THE TOP PAINTED COLOR OF UTILITY AND MARKED WITH THE LOT NUMBER TO BE SERVED.

PERMANENT MARKING OF SERVICE – ALL WATER SERVICE LOCATIONS SHALL BE PERMANENTLY ETCHED INTO CONCRETE CURB WITH "W" AND PAINTED BLUE FOR POTABLE WATER AND "R" AND PAINTED PURPLE FOR RECLAIMED WATER. ANY EXCEPTION MUST HAVE PRIOR APPROVAL OF CITY.
3. 18 INCH MINIMUM SPACING BETWEEN SERVICE TAPS.

RESIDENTIAL SERVICES LAYOUT – POTABLE AND RECLAIMED

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY:	L.A.M.	A-118
J.R.P.			

1" SERVICE TAP

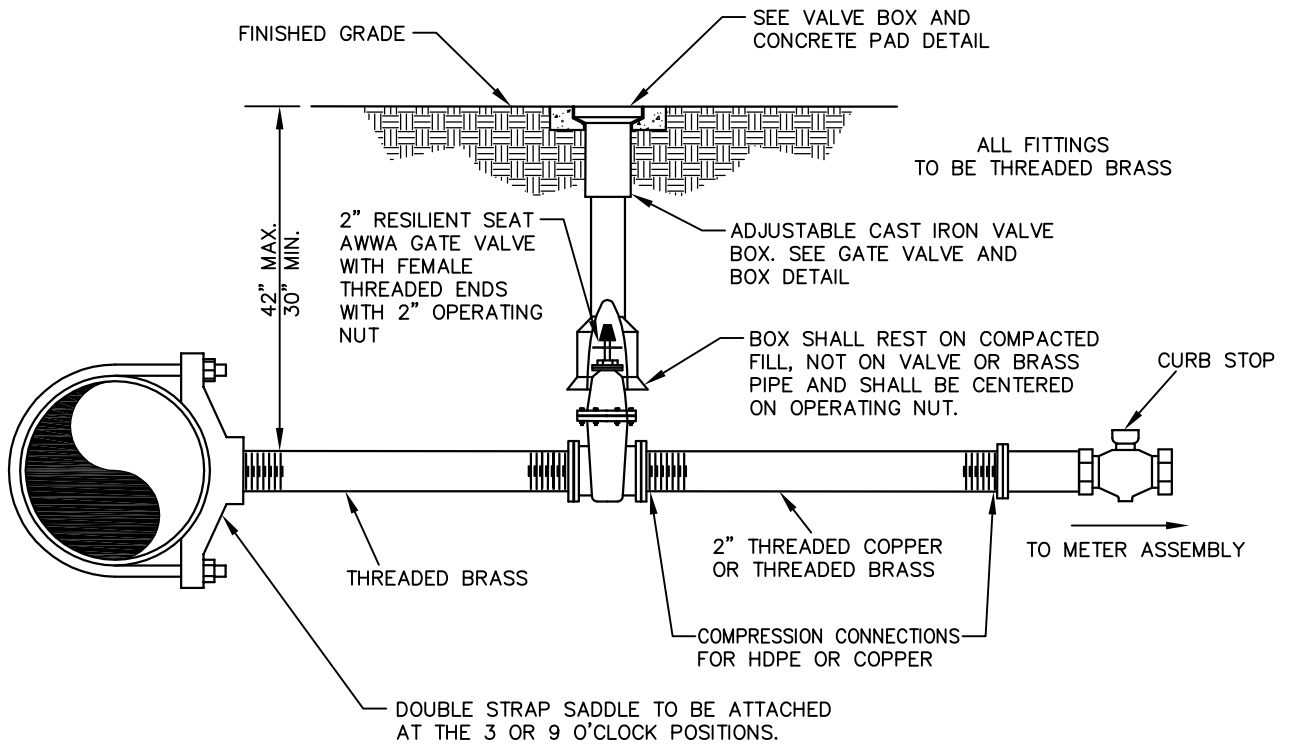


MAIN SIZE	OUTLET SIZE	SERVICE SADDLE
4"	1"	SINGLE STRAP
	2"	DOUBLE STRAP
6"	1"	SINGLE STRAP
	2"	DOUBLE STRAP
8" & LARGER	1"	SINGLE STRAP
	2"	DOUBLE STRAP

MAXIMUM SIZE OUTLET FOR USE WITH DOUBLE STRAP SERVICE CLAMP

PIPE SIZE	OUTLET SIZE
4"	2"
6"	2"
8"	2"
10"	2"
12" & GREATER	2"

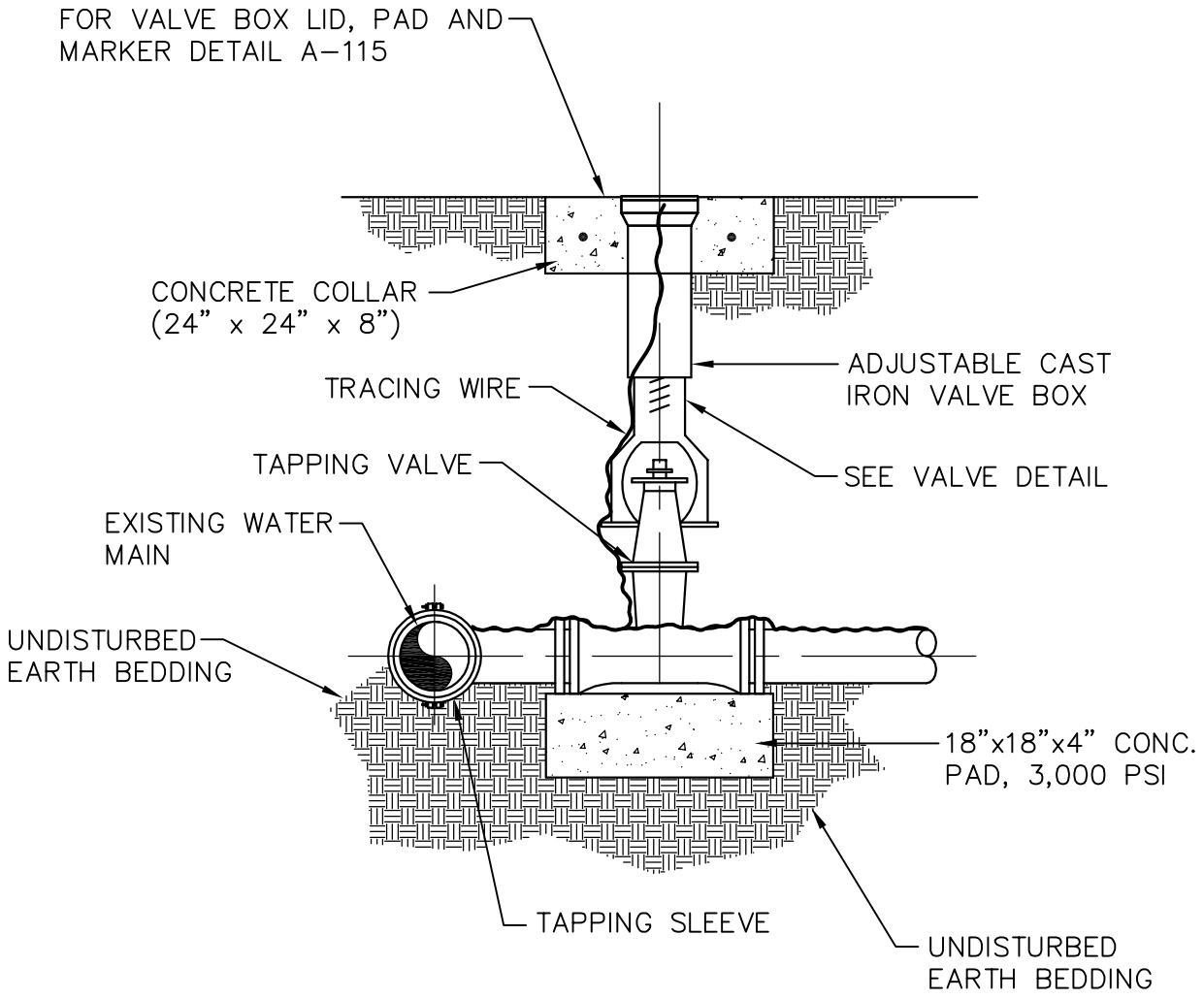
2" SERVICE TAP



TYPICAL SERVICE SADDLE CONNECTION – POTABLE AND RECLAIMED

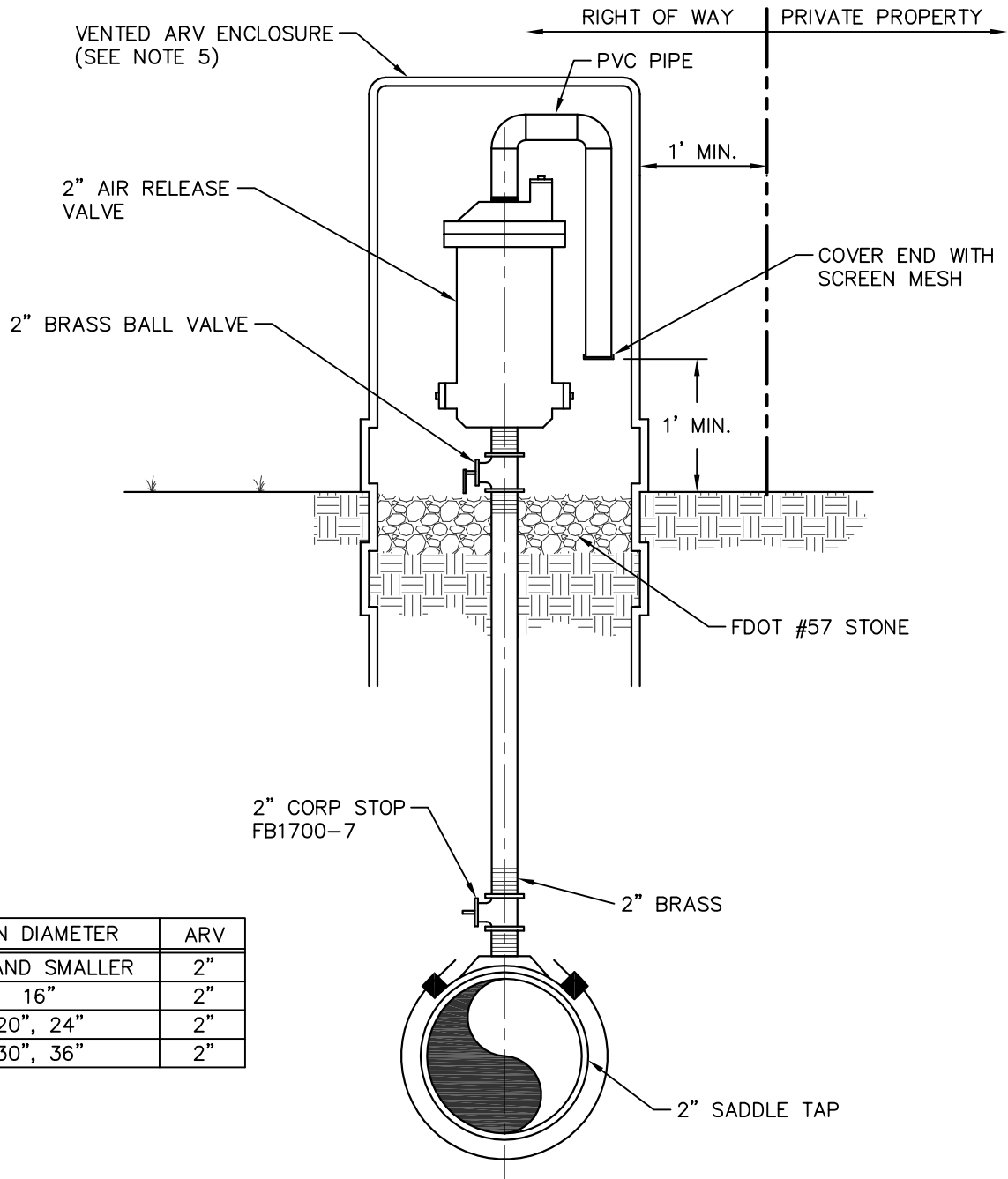
REV:	REV. BY:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:	N.T.S.
DATE:	JOB NO.:		DWG NO.:	A-119
DRAWN BY:	DSGN. BY:			

DATE: 7/1/16 JOB NO.: DWG NO.: A-119
 DRAWN BY: J.R.P. DSGN. BY: L.A.M.



TYPICAL TAPPING SLEEVE SERVICE CONNECTION – POTABLE AND RECLAIMED

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY:	L.A.M.	A-120
J.R.P.			



MAIN DIAMETER	ARV
12" AND SMALLER	2"
16"	2"
20", 24"	2"
30", 36"	2"

NOTES:

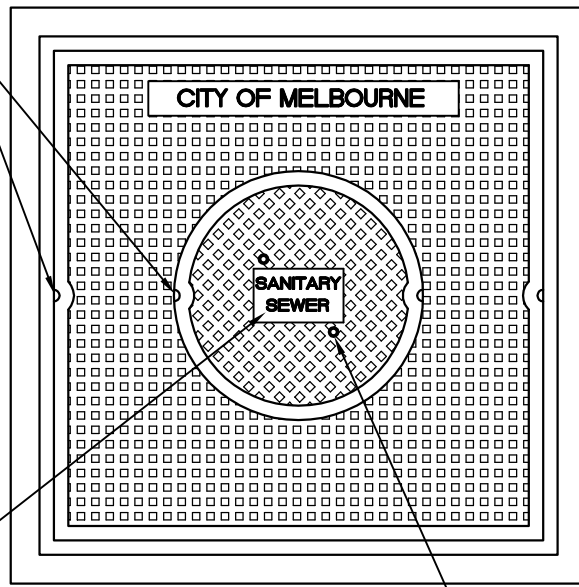
1. APPROVED FOR POTABLE AND RECLAIMED SYSTEMS ONLY.
2. ABOVE DETAIL APPLIES TO A 2" ARV. FOR LARGER ARVS, PIPE DIAMETER AND VALVES SHALL BE EQUAL TO THE SIZE OF THE ARV.
3. ALL PIPING, VALVES AND APPURTENANCES TO BE BRASS OR 316 S.S. EXCEPT WHERE SPECIFIED OTHERWISE.
4. THE ENCLOSURE VENTS MUST BE CAPABLE OF ALLOWING AT LEAST THE SAME AMOUNT OF AIRFLOW AS THE VALVE. BLUE ENCLOSURE FOR POTABLE WATER; GREEN ENCLOSURE FOR RECLAIMED WATER.
5. BOLLARDS SHALL BE REQUIRED WHERE CONDITIONS WARRANT ADDITIONAL PROTECTION.

AIR VALVES – ABOVE GRADE – POTABLE AND RECLAIMED

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
7/1/16	JOB NO.:		DWG NO.:
DRAWN BY:	DSGN. BY:	L.A.M.	A-121
J.R.P.			

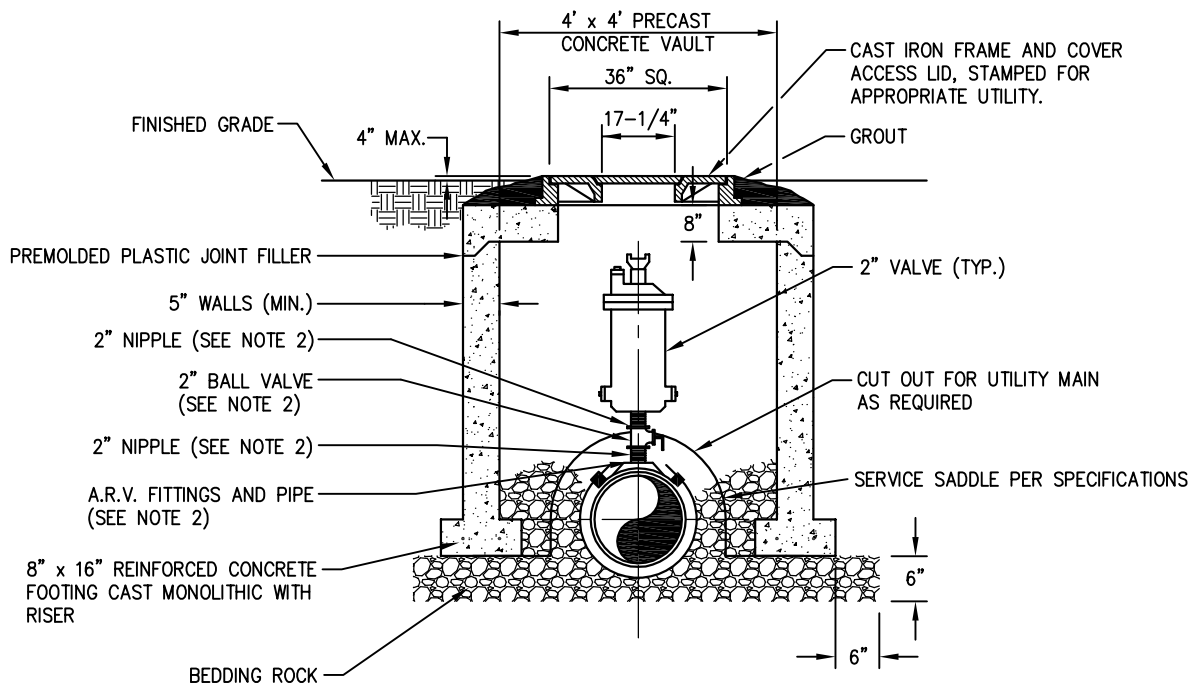
(4) - PENETRATING PICKHOLES

COVER TO BE STAMPED WITH THE
APPROPRIATE UTILITY;
'RECLAIMED WATER'
'SANITARY SEWER'



(2) - 5/8"Ø VENT HOLES

FRAME AND COVER DETAIL



NOTES:

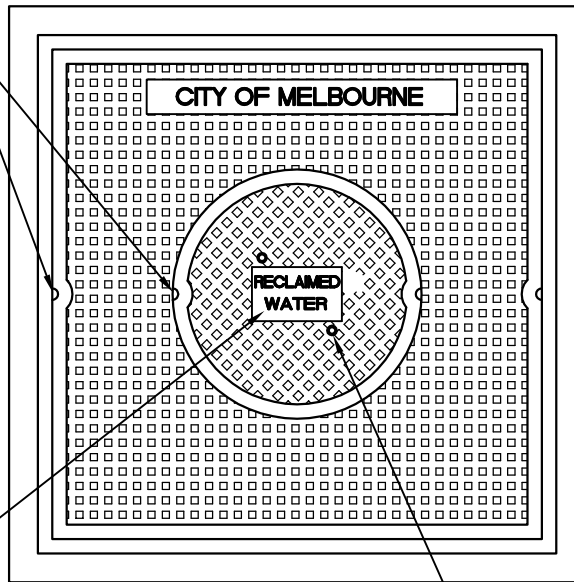
1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.
2. MATERIAL USED FOR RECLAIMED WATER SHALL BE MADE OF BRASS; MATERIAL USED FOR WASTEWATER SHALL BE MADE OF STAINLESS STEEL.

AIR VALVES IN VAULT – RECLAIMED AND WASTEWATER

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
DRAWN BY:	DSGN. BY		DWG NO.:
7/1/16	L.A.M.	A-122	

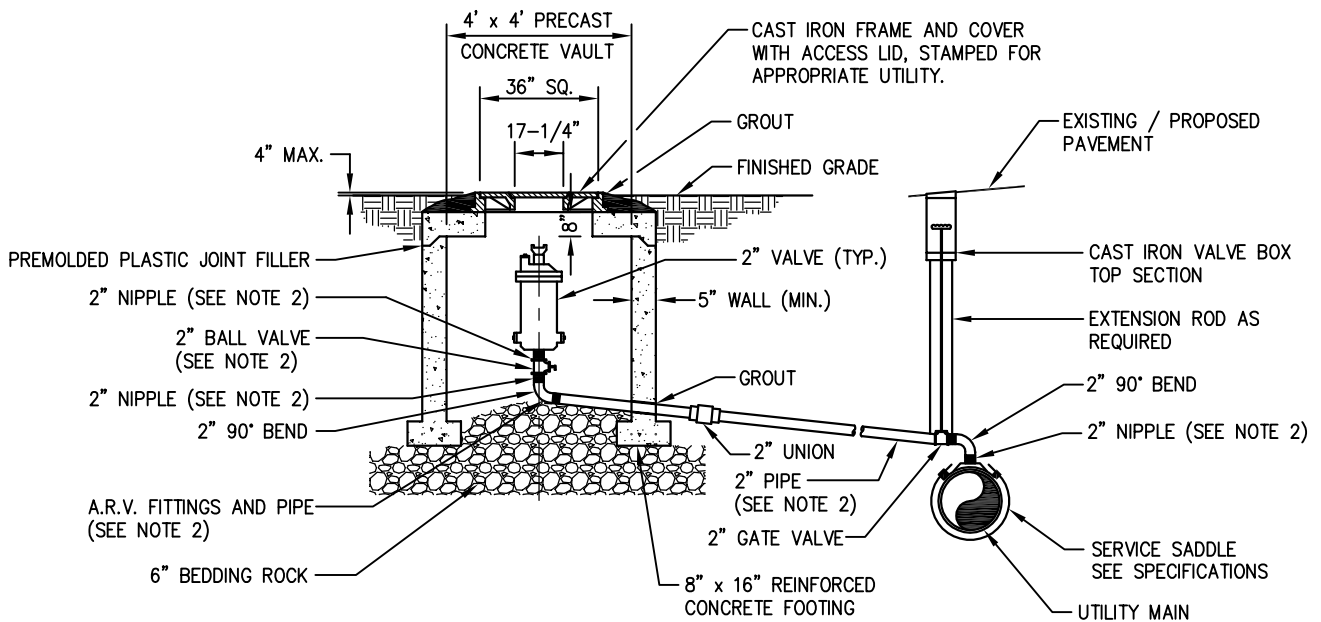
(4) - PENETRATING PICKHOLES

COVER TO BE STAMPED WITH THE
APPROPRIATE UTILITY;
'RECLAIMED WATER'
'SANITARY SEWER'



(2) - 5/8"Ø VENT HOLES

FRAME AND COVER DETAIL

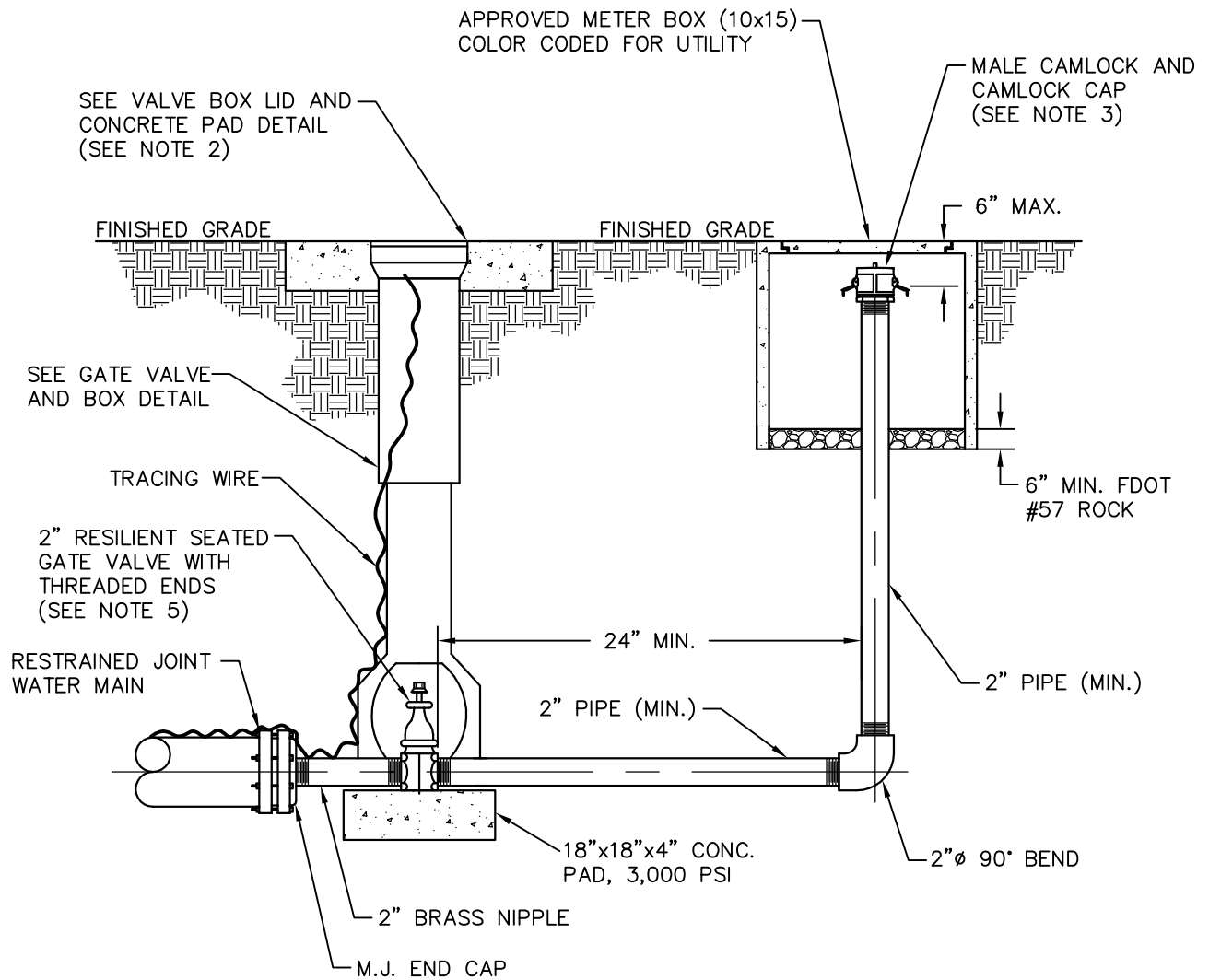


NOTES:

1. ABOVE DETAIL IS BASED ON 2" COMBINATION AIR/VACUUM RELEASE VALVE. CHANGE PIPE AND FITTINGS ACCORDINGLY FOR OTHER VALVE SIZES AND TYPES. VALVE SIZES TO BE DETERMINED BY THE ENGINEER AND APPROVED BY THE CITY PRIOR TO INSTALLATION.
2. MATERIAL USED FOR RECLAIMED WATER SHALL BE MADE OF BRASS; MATERIAL USED FOR WASTEWATER SHALL BE MADE OF STAINLESS STEEL.
3. IF DISTANCE BETWEEN MAIN AND VALVE IS GREATER THAN 15', A.R.V. MUST BE ENGINEERED.

AIR VALVES IN VAULT – OFFSET – RECLAIMED AND WASTEWATER

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY		N.T.S.
DRAWN BY:	DSGN. BY		DWG NO.:
7/1/16	L.A.M.	A-123	



NOTES:

1. ALL 2" PIPE AND FITTINGS SHALL BE BRASS WITH THREADED (NPT) JOINTS.
2. VALVE BOX LIDS USED IN POTABLE WATER SYSTEMS SHALL BE STAMPED "WATER" AND PAINTED BLUE. VALVE BOX LIDS USED IN RECLAIMED WATER SYSTEMS SHALL BE STAMPED "REUSE" AND BE PAINTED PURPLE. SEE APPROVED PRODUCTS LIST FOR APPROVED PAINT.
3. CAMLOCK AND CAMLOCK CAP SHALL BE ALUMINUM.
4. PROTECT ALL FITTINGS, NIPPLES AND BOLTS FROM CONCRETE WITH VISQUEEN.
5. IF TERMINUS VALVE IS INSTALLED, OMIT 2" GATE VALVE.

MANUAL BLOWOFF

REV:	REV:		
DATE:	BY:		
7/1/16	JOB NO.:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE: N.T.S.
DRAWN BY: J.R.P.	DSGN. BY: L.A.M.		DWG NO. A-124



Reclaimed Water Details

SIGNS FOR PROPERTY USING RECLAIMED WATER FOR IRRIGATION

SIGNS MUST BE 18" HIGH AND 12" WIDE IN SIZE AND HAVE A PURPLE REFLECTIVE BACKGROUND.
 LETTERS ARE TO BE WHITE REFLECTIVE AND BE ONE INCH IN HEIGHT.
 SIGNS MUST HAVE A 3/8" WHITE REFLECTIVE BORDER.
 SIGNS MUST BE ALUMINUM AND HAVE A MINIMUM OF 0.063 GAGE.



NOTES:

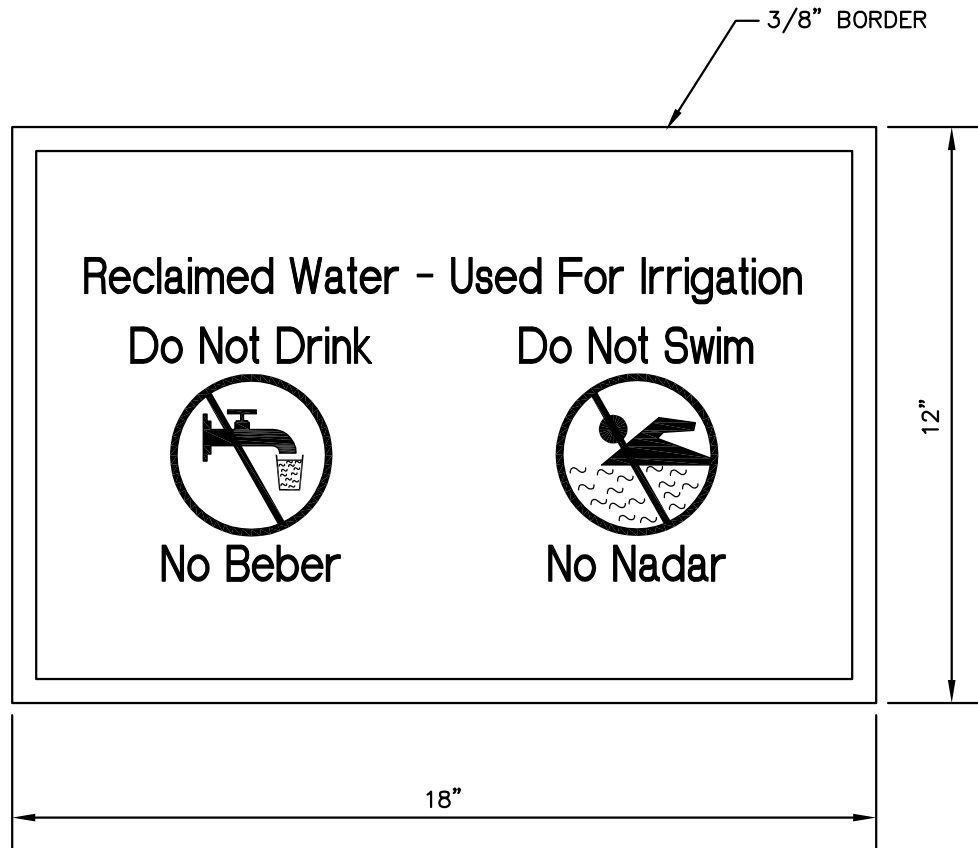
1. ALL SIGNS MUST BE VISIBLY POSTED AT EACH ENTRANCE AND BE A MINIMUM OF 24" ABOVE FINISHED GRADE OF ROAD CROWN AND WITHIN 5 FEET OF EDGE OF CURB.
2. CITY WILL PROVIDE SIGNS. CONTRACTOR IS RESPONSIBLE FOR POST(S) AND INSTALLATION.
3. SIGNS SHALL BE INSTALLED ON SEPARATE GALVANIZED, 6', U-CHANNEL DELINEATOR POST WITH PRE-DRILLED HOLES EVERY INCH.

RECLAIMED WATER NOTIFICATION SIGNS

REV:	REV: BY	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE: N.T.S.
DATE: 7/1/16	JOB NO.:		DWG NO. A-300
DRAWN BY: J.R.P.	DSGN. BY: L.A.M.		

SIGNS FOR PROPERTY USING RECLAIMED WATER FOR IRRIGATION

SIGNS MUST BE 12" HIGH AND 18" WIDE IN SIZE AND HAVE A PURPLE REFLECTIVE BACKGROUND. LETTERS ARE TO BE WHITE REFLECTIVE AND BE THREE-QUARTER INCH IN HEIGHT. SIGNS MUST HAVE A 3/8" WHITE REFLECTIVE BORDER. SIGNS MUST BE ALUMINUM AND HAVE A MINIMUM OF 0.063 GAGE.

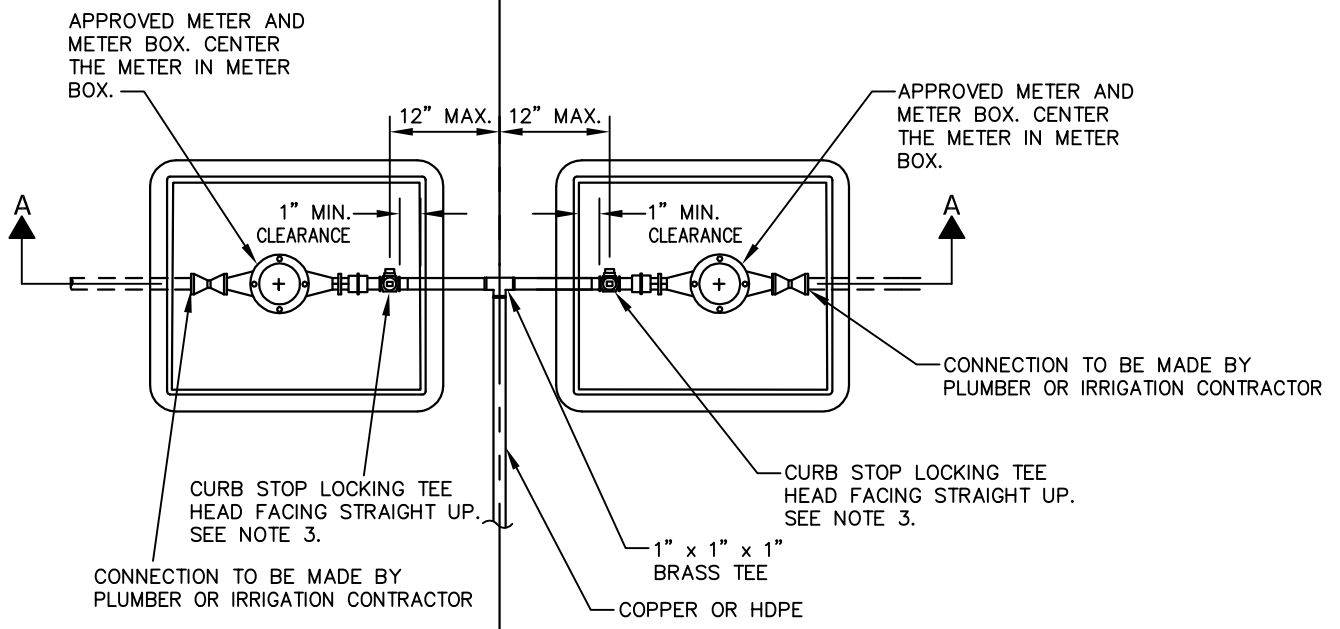


NOTES:

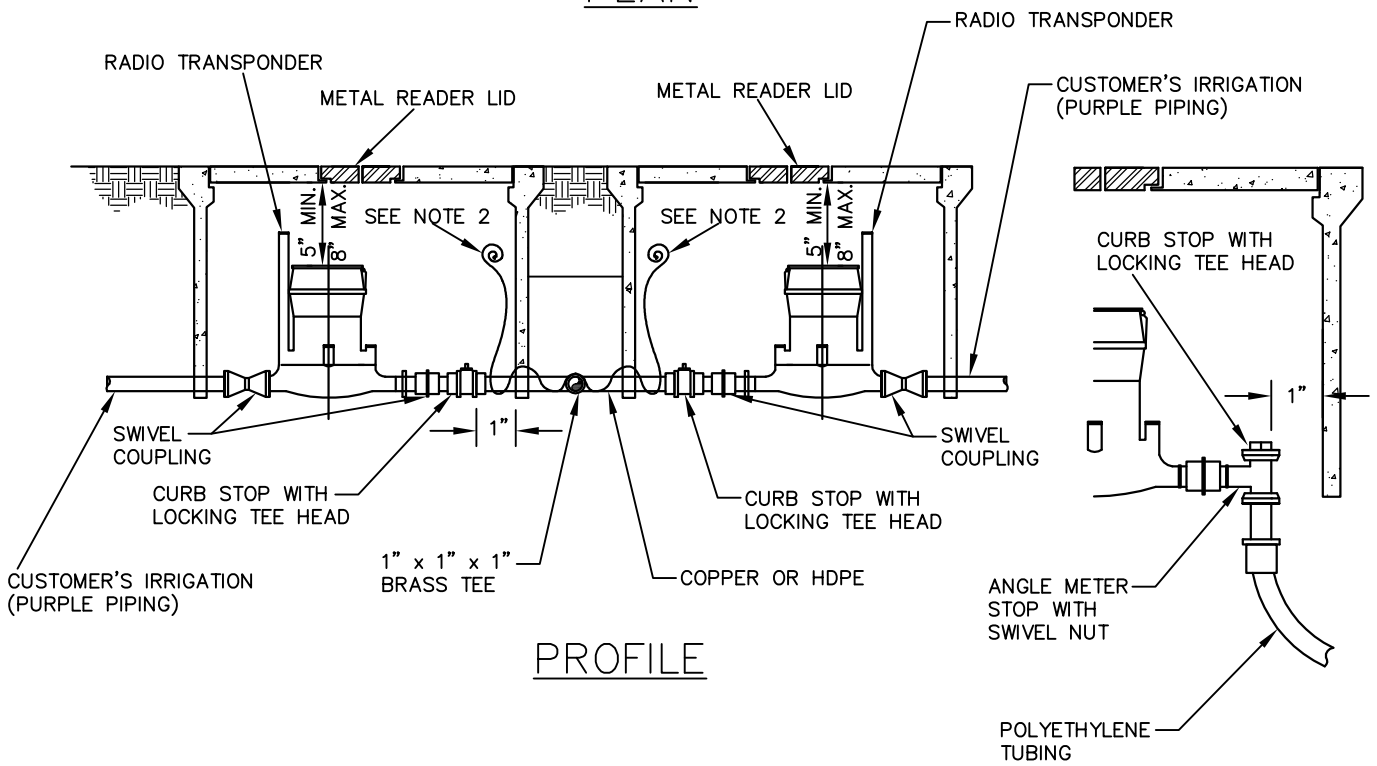
1. ALL SIGNS MUST BE VISIBLY POSTED AT EACH ENTRANCE AND BE A MINIMUM OF 24" ABOVE FINISHED GRADE OF ROAD CROWN AND WITHIN 5 FEET OF EDGE OF CURB.
2. CITY WILL PROVIDE SIGNS. CONTRACTOR IS RESPONSIBLE FOR POST(S) AND INSTALLATION.
3. SIGNS SHALL BE INSTALLED ON SEPARATE GALVANIZED, 6', U-CHANNEL DELINEATOR POST WITH PRE-DRILLED HOLES EVERY INCH.

RECLAIMED WATER NOTIFICATION SIGNS – STORAGE LAKES & PONDS

REV:	REV. BY:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:	N.T.S.
DATE:	JOB NO.:		DWG NO.:	A-301
DRAWN BY:	DSGN. BY:			
J.R.P.	L.A.M.			



PLAN



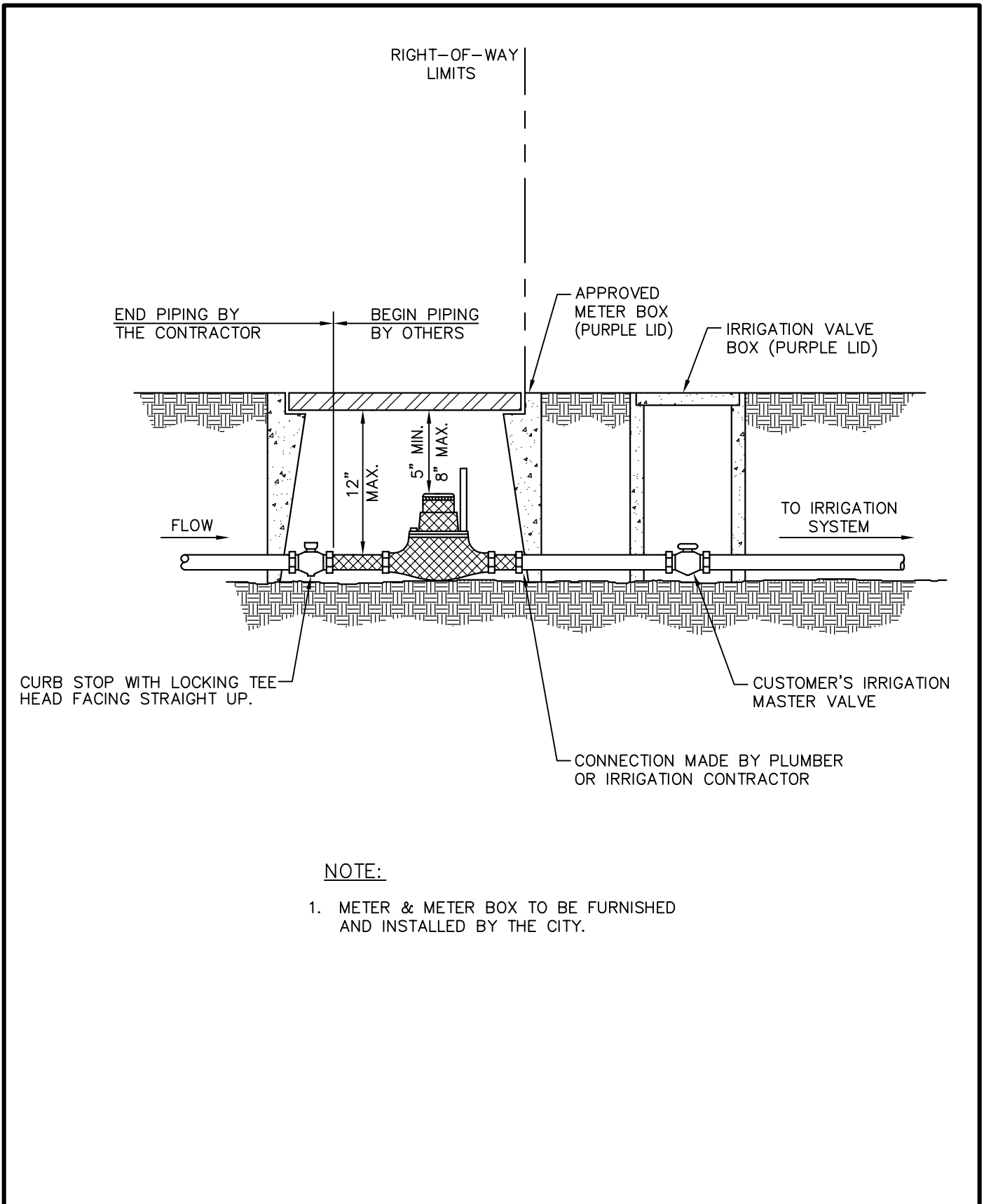
PROFILE

NOTES:

1. NO SERVICE LINE SHALL TERMINATE UNDER A DRIVEWAY OR SIDEWALK.
2. TRACING WIRE FOR HDPE SERVICE LINES TO BE COILED UP INSIDE BOX SO IT CAN EXTEND A MINIMUM OF 12" OUTSIDE OF METER BOX.
3. 1" CURB STOPS MUST HAVE "RECLAIMED WATER" STRAIGHT LEVEL HANDLE INSTALLED.

RESIDENTIAL RECLAIMED WATER METER AND METER BOX

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
DRAWN BY:	DSGN. BY:		DWG NO.:
7/1/16	L.A.M.	A-302	

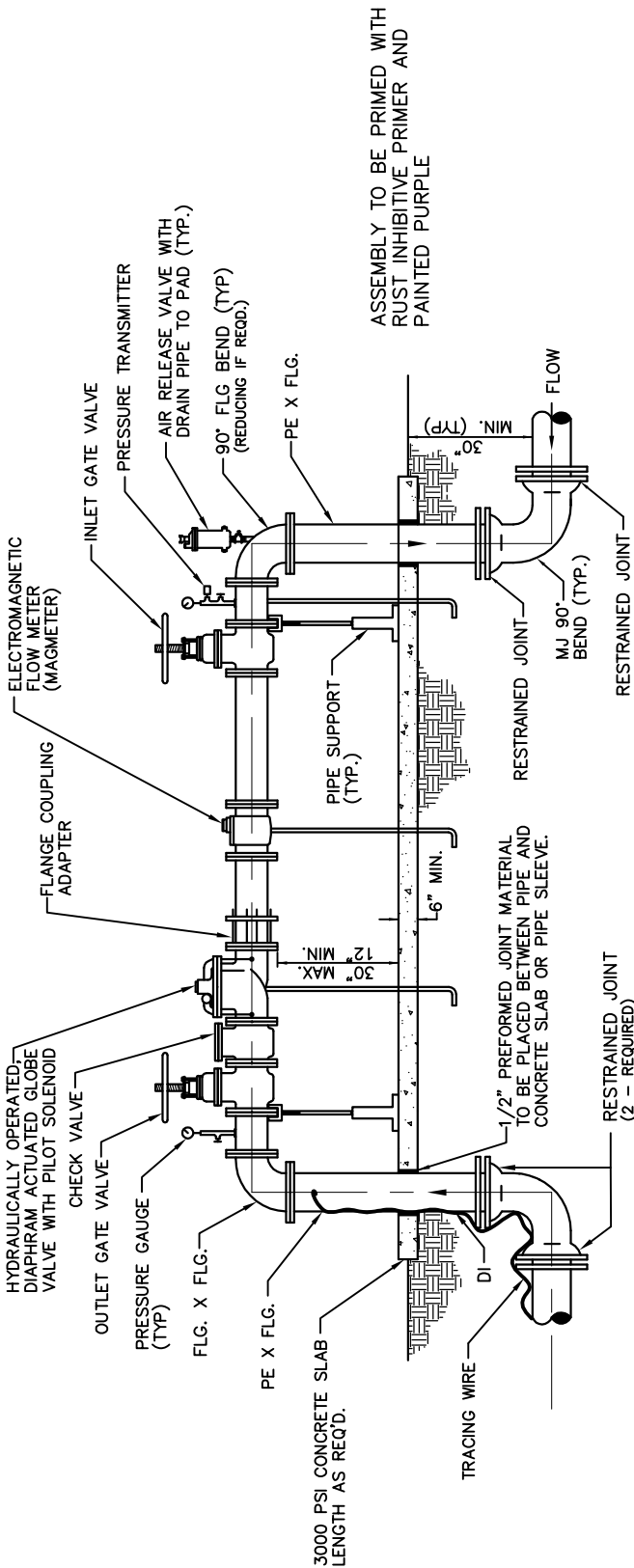


COMMERCIAL RECLAIMED WATER METER – 2" AND SMALLER

REV:	REV. BY:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:	N.T.S.
DATE:	JOB NO.:		DWG NO.:	A-303
DRAWN BY:	DSGN. BY:			
	J.R.P.	L.A.M.		

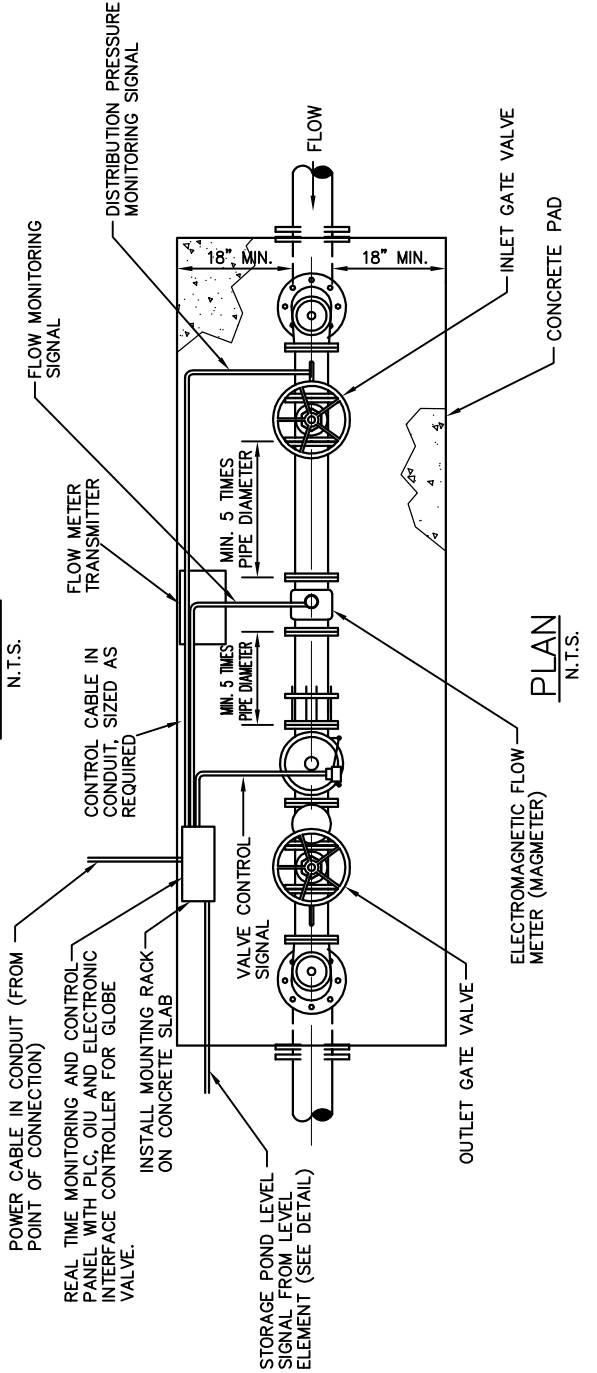
ALL ABOVE GROUND PIPING SHALL BE FLANGED DUCTILE IRON. FIELD FABRICATED FLANGES ARE UNACCEPTABLE.

DEVICE TO BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.



ASSEMBLY TO BE PRIMED WITH RUST INHIBITIVE PRIMER AND PAINTED PURPLE

PROFILE
N.T.S.



PLAN
N.T.S.

COMMERCIAL RECLAIMED WATER METER - 3" AND LARGER (MAGMETER & TELEMETRY)

REV:	REV:
DATE: 7/1/16	BY:
DRAWN BY: J.R.P.	DSGN. BY: L.A.M.

CITY OF MELBOURNE
UTILITIES ADMINISTRATION

SCALE:	N.T.S.
DWG NO.:	A-305

COLOR CODING REQUIREMENTS FOR RECLAIMED WATER IRRIGATION SYSTEMS

IRRIGATION SYSTEM COMPONENT	COLOR CODING REQUIREMENT
PIPE	MUST BE COLOR CODED PURPLE, PIGMENT ADDED AT TIME OF MANUFACTURE
SPRAYS	MUST BE COLOR CODED PURPLE. PIGMENT ADDED AT TIME OF MANUFACTURE. FIELD INSTALLED CAPS <u>NOT</u> PERMITTED ON NEW INSTALLATIONS.
ROTORS	MUST BE COLOR CODED PURPLE. PIGMENT ADDED AT TIME OF MANUFACTURE.
VALVE BOXES	MUST BE COLOR CODED PURPLE. PIGMENT ADDED AT TIME OF MANUFACTURE.
ABOVE GROUND METERS	MUST BE COLOR CODED PURPLE. REFERENCE APPROVED PRODUCTS LIST FOR PAINT SPECIFICATIONS.
HOSE BIBS	SHALL BE QUICK COUPLER TYPE WITH LOCKING, NON-POTABLE CAP AND BE LOCATED BELOW GRADE.
SIGNAGE	SIGNS PROVIDED BY CITY. CONTRACTOR RESPONSIBLE FOR POST AND INSTALLATION.
BUBBLER	NO COLOR REQUIREMENT AT THIS TIME. USE OF PURPLE BUBBLER IS AT OWNER'S DISCRETION.
DISTRIBUTION HOSE	NO COLOR REQUIREMENT AT THIS TIME. USE OF PURPLE HOSE IS AT OWNER'S DISCRETION.
DRIPLINE	NO COLOR REQUIREMENT AT THIS TIME. USE OF PURPLE DRIPLINE IS AT OWNER'S DISCRETION.
ZONE VALVES	NO COLOR REQUIREMENT AT THIS TIME. USE OF PURPLE ZONE VALVE IS AT OWNER'S DISCRETION.

COLOR CODING REQUIREMENTS FOR RECLAIMED WATER IRRIGATION SYSTEMS

REV:	REV:	CITY OF MELBOURNE UTILITIES ADMINISTRATION	SCALE:
DATE:	BY:		N.T.S.
7/1/16			
DRAWN BY:	DSGN. BY:		DWG NO.:
J.R.P.	L.A.M.		A-306