August 30, 2019

To: Shahab Biazar, P.E., City Engineer,
   City of Albuquerque

From: David Laughlin, P.E., Chief Engineer, Planning & Engineering Division
       Albuquerque Bernalillo County Water Utility Authority

Subject: City of Albuquerque Standard Specifications for Public Works Construction
         – 2019 Update Summary
         Albuquerque Bernalillo County Water Utility Authority
         Revisions, Deletions, and Additions - Summary

The following is a brief summary of the Water Authority’s 2019 changes to the City of Albuquerque Standard Specifications for Public Works Construction that will, upon approval, become adopted as the 2019 Specifications update. The summary items below represent changes that have been made after the publication of Update No. 9 in 2015, and after the January 2018 updated drawings/specifications that the Water Authority provided to the City of Albuquerque on January 10, 2018.

For this 2019 update summary, the section numbers are shown along with a very brief description of specific changes to the given specification or detail drawing.

SECTION 170    ELECTRONIC MARKING DEVICES

170.1 Contents of section updated to clarify EMD selection from the current Water Authority Approved Products List;

170.3 Contents of section updated to reflect correct installation for various types of EMDs, per manufacturer’s (3M & Greenlee) product instructions;

170.4.1.9.2 & 170.4.2.3 Removed “stacked” fractions which can make font too small to read

SECTION 801    INSTALLATION OF WATER TRANSMISSION, COLLECTOR, AND DISTRIBUTION LINES

801.2 Updated References Section to reflect updated standards for water pipes and appurtenances;
801.9.12 Added new section 801.9.12 Trace Wire, with multiple subsections that summarize the requirements for installation of trace wire on all public potable and non-potable water mains.

801.9.12.7.1.16 Contents of section updated to eliminate grounding anode in meter boxes. Instead, excess/slack trace wire shall be folded in the meter box.

801.9.12.9.1 Contents of section updated to confirm grounding anodes are required for installation at termination points on the water main, but grounding anodes are not required or desired in the meter boxes.

801.22.1 Contents of section updated to clarify that EMDs, pipe locator tape, and trace wire system for pipe shall be included in the contract unit price of the pipe;

801.22.2.1 Contents of section updated to clarify that the contract unit price for pipe and appurtenances shall in all cases include trenching, installation, and compacted backfilling for all trench cuts.

801.22.12.4 Contents of section updated to clarify measurement and payment for waterline lowerings;

801.22.21 Added new section 801.22.21 Trace Wire to confirm that trace wire system installation shall be considered incidental to the installation cost of the pipeline;

SECTION 901 SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

901.5.1.9 Added new section 901.5.1.9 Trace Wire, with multiple subsections that summarize the requirements for installation of trace wire on all public sanitary sewer interceptor, collector, and other lines;

901.9.6 Added new section 901.9.6 Trace Wire to confirm that trace wire system installation shall be considered incidental to the installation cost of the pipeline;

Section 2100 – STANDARD DETAILS FOR SANITARY SEWER

Index Added drawings 2103, 2110, 2111, 2120, 2190, 2191,

2101 Updated ball-type EMD location per manufacturer’s recommendations

2102 Updated ball-type EMD location per manufacturer’s recommendations. Updated manhole cross section, removing the incorrect vertical extension at the top of the cone.
2103 Added drawing (Sanitary sewer typical placement of manholes at intersections)
2110 Added drawing (Sanitary sewer manhole lift station and valve vault)
2111 Added drawing (Sanitary sewer manhole lift station details)
2116 Updated drawing. Added general notes and removed option for cross in drop.
2120 Added drawing (Sanitary Sewer Trap Manhole) for odor control
2125 Updated construction notes E and N
2134 Updated construction note M
2145 Updated EMD construction note.
2160 Updated manhole concrete collar graphic to include adjustment rings per Std Dwg 2460. Updated note K to read 4000 psi instead of 400. Updated location of EMD per spec section 170.
2181 Updated location of EMD, added reference to Std Dwg 2169
2183 Updated manhole geometry and location of EMD
2190, 2191 Added drawings for Trace Wire Details.

Section 2300 – STANDARD DETAILS FOR WATER

Index Added drawings 2302, 2303, 2324, 2325, 2342, 2346, 2349, 2365, 2372, 2379,
2302, 2303, 2324, 2325, 2342, 2365, 2379 Trace Wire Details. This new and updated group of drawings provides direction for installation of trace wire on water lines and appurtenances.
2335 Updated general notes adding requirements for fall protection and hatches.
2340 Added stationary post detail to the drawing for hydrant installations without curb and gutter.
2341, 2341A Added drawings for water quality sampling stations
2344 Updated drawing for clarity.
2346 Added drawing (Water typical placement of valves at arterial intersections)
Updated drawing and title for clarity.

Added drawing (Water CAV valve vault for 12-inch and Smaller Dia. Water Mains)

Updated drawing and title to read: “Water CAV Valve Vault for 14-inch and Larger Dia. Water Mains”. Provided detailed notes and revised vault layout for improved maintenance/operation.

Updated drawing for clarity on in-vault butterfly valve installation for concrete cylinder transmission lines

Updated drawing for clarity on in-vault butterfly valve installation for ductile iron transmission lines

Revised drawing for PRV vaults.

Removed Drawing

Removed Drawing

Removed Drawing

Updated drawing for clarity on direct-bury butterfly valve installation for ductile iron transmission lines

Updated drawing for clarity on direct-bury butterfly valve installation for concrete cylinder transmission lines

Updated drawing for clarity.

Updated drawing for clarity

Updated drawing with correct reference to meter box and cover.

Updated drawing for clarity, correct note references, and details.

Updated drawing for clarity, updated top slab detail.

Updated drawing for clarity, updated top slab detail.

Added drawing (Water Concrete Cylinder Pipe Butt Strap Connection)
Section 2400 – STANDARD DETAILS FOR PAVING

2460 Updated drawing and changed title block to indicate joint Water Authority-City of Albuquerque usage.

2461 Updated drawing and changed title block to indicate joint Water Authority-City of Albuquerque usage.
SECTION 170
ELECTRONIC MARKER DEVICES

170.1 GENERAL: Electronic location markers shall consist of devices having a passive inductive device capable of reflecting a specifically designated impulse frequency, unique to the utility being installed. Devices shall be color-coded in accordance with the American Public Works Association’s Utility Location and Coordinating Council Standards. Electronic Marker Devices (EMDs) shall be selected from the current Water Authority Approved Product List.

170.2 REFERENCES

170.3 INSTALLATION: Marker devices shall be installed directly above the point to be located, and a minimum of 6-inches separation with clean fill from any metal object. Depth of burial varies per model of EMD used. Spherical/Ball Markers shall not be installed at a depth greater than 4-feet, or less than 2-feet to finished ground. Near-surface markers shall not be installed greater than 2-feet below finished ground. Ball markers shall be hand-backfilled to 1-foot above the device to prevent movement or damage.

170.4 PLACEMENT: Electronic Marker Devices shall be installed at the following locations:

170.4.1 SANITARY SEWER

170.4.1.1 At all manholes, one foot upstream of the manhole over the centerline of the main line.

170.4.1.2 At temporary dead ends of lines.

170.4.1.3 At the property line for all service laterals, including service stubs from vacuum pits.

170.4.1.4 At the centerline of the gravity main line over all taps, risers, wyes or deflections (points of curvature).

170.4.1.5 At all plugged tees.

170.4.1.6 At upper bend on vacuum sewer lifts.

170.4.1.7 At wye for branch line connection to vacuum sewer main.

170.4.1.8 At valves on vacuum sewer mains, one foot north or west of the valve over the line.

170.4.1.9 On Sanitary Sewer Force Mains:

170.4.1.9.1 At valves, one foot north or west of the valve over the main line.

170.4.1.9.2 At pipe deflections and bends 11-1/4 degrees and larger.

170.4.1.9.3 At capped or plugged ends.

170.4.1.9.4 At tees over the main line.

170.4.1.9.5 For single services, over the main line at the service tap.

170.4.1.9.6 On runs of main line, the maximum spacing between EMDs shall be 100 feet.

170.4.2 WATER LINES:

170.4.2.1 At valves, one foot north or west of the valve over the main line.

170.4.2.2 At flanged outlets on concrete cylinder pipes.

170.4.2.3 At pipe deflections and bends 11-1/4 degrees and larger.

170.4.2.4 At capped or plugged ends.

170.4.2.5 At tees over the main line.

170.4.2.6 For single services, over the main line at the service tap.

170.4.2.7 For double services, over the main line halfway between the service taps.

170.4.2.8 On runs of main line, the maximum spacing between EMDs shall be 100 feet.

170.5 CERTIFICATION

170.5.1 The CONTRACTOR shall certify in writing that the Electronic Marker Device is in place, prior to paving over any of the above locations. Electronic Marker Devices that are found to be missing shall be installed at the CONTRACTOR’s expense.

170.6 MEASUREMENT AND PAYMENT: No separate measurement or payment will be made for Electronic Marker Devices.
SECTION 801
INSTALLATION OF WATER TRANSMISSION, COLLECTOR, AND DISTRIBUTION LINES

801.1 GENERAL: The water facilities and materials, specified herein, are associated with water transmission, collector and distribution lines.

801.2 REFERENCES:

801.2.1 American Water Works Association (Latest Edition) (AWWA):

C110 American National Standard for Ductile-Iron and Gray-Iron Fittings, 3-inch through 48-inch, for Water and Other Liquids

C203 Coal-Tar Protective Coatings and Linings for Steel Water Pipelines – Enamel and Tape-Hot-Applied

C206 Field Welding of Steel Water Pipe

C207 Steel Pipe Flanges for Waterworks Service Size 4-inch through 144-inch

C502 Dry Barrel Fire Hydrants

C504 Rubber-Seated Butterfly Valves

C509 Resilient-Seated Gate Valves for and Water Supply Service

C515 Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service

C600 Installation of Ductile-Iron Water Mains and Their Appurtenances

C604 Installation of Steel Water Pipe – 4-inch (100 mm) and Larger

C605 Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water

C651 Disinfecting Water Mains

C900 Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4-inch through 60-inch for Water Transmission and Distribution

M9 Concrete Pressure Pipe

M23 PVC Pipe-Design and Installation

801.2.2 This Publication

Section 129 Ductile Iron Pipe

Section 130 Gray Iron, Ductile Iron, and Steel Fittings

Section 161 Gray Iron Castings

Section 163 Ductile Iron Castings

Section 170 Electronic Marker Devices

Section 340 Portland Cement Concrete Curbs, Gutters, Walks, Driveways, Alley Intersections, Slope Paving, and Median Paving

Section 343 Removal and Disposal of Existing Pavement, Curbs, Gutters, Sidewalks, & Drivepads

Section 701 Trenching, Excavation, and Backfill

Section 1502 Submittals

801.2.3 American Association of State Highway and Transportation Officials (AASHTO)

M 245 Standard Specification for Corrugated Steel Pipe, Polymer-Pre-coated for Sewers and Drains

M 246 Standard Specification for Steel Sheet, Metallic-Coated and Polymer-Pre-coated, for Corrugated Steel Pipe

801.2.4 American Society for Testing and Materials (ASTM)

A 742 Standard Specification for Steel Sheet, Metallic Coated and Polymer Pre-coated for Corrugated Steel Pipe

A 762 Standard Specification for Corrugated Steel Pipe, Polymer Pre-Coated for Sewers and Drains

801.3 MATERIALS

801.3.1 GENERAL

801.3.1.1 The CONTRACTOR shall submit certification from the manufacturer of the pipe as specified in Section 1502 as to the pipe material and that the pipe meets or exceeds the required testing. Only pipe listed on the Water Authority Approved Product List shall be accepted unless otherwise approved in writing by the Water Authority Field Division Manager.

801.3.1.2 Main line pipe and fittings shall be as specified in the Reference Section in this publication as listed above or as specified in the Supplemental Technical Specifications and/or as authorized by the ENGINEER.

801.3.2 PIPE
SECTION 801

INSTALLATION OF WATER TRANSMISSION, COLLECTOR, AND DISTRIBUTION LINES

801.3.2.1 Limitations of pipe materials versus pipe sizes will be as follows, unless otherwise specified on the plans or Supplemental Technical Specifications:

801.3.2.1.1 PIPE TYPE - SIZE
Ductile Iron - 4-inch to 64-inch
Concrete Cylinder - 24-inch and larger
Plastic (Blue - PVC-C900) - 4-inch to 24-inch
Plastic (Purple - PVC-C900) - 4-inch to 24-inch

801.3.3 GATE VALVES:

801.3.3.1 Gate valves shall only be used for pipe sizes of 12 inches and smaller, unless otherwise noted on the plans or in the Supplemental Technical Specifications.

801.3.3.2 All gate valves shall be resilient seat valves and shall conform to AWWA C515. The valve shall be a non-rising stem type with inside screw and “O” ring seals. The valve shall have a standard hub which opens counterclockwise. The valve ends shall be mechanical joints, unless otherwise specified on the plans. The “O” ring retainer shall be secured with nuts and bolts.

801.3.3.3 The resilient seat shall be mechanically retained or bonded on the valve gate (wedge disc).

801.3.3.4 All brass or bronze parts used on gate valves shall conform to AWWA C515.

801.3.3.5 The outside of the valve body shall be painted with a corrosion-resistant coating. The inside shall be protected with corrosion resistant coating, approved for potable water.

801.3.3.6 The valve stem shall comply with AWWA C515. The material for the valve stem shall be brass or bronze, and shall have a minimum yield strength of 20,000 psi and minimum tensile strength of 60,000 psi.

801.3.3.7 Gate valves shall have a 2-inch square operating hub nut. Gate valves in vaults with valve covers at ground level shall have a handwheel with the 2-inch nut welded to the center. For a 4-inch, 6-inch, 8-inch, 10-inch, and 12-inch valve, the minimum outside diameter of the handwheel will be 10-inch, 12-inch, 14-inch, 16-inch, and 16-inch respectively. Handwheel diameters shall not be less than those stated in AWWA C509, Table 5.

801.3.3.8 Maximum input torque to open and/or close the valve shall be 200 foot-pounds for a 4-inch valve and 300 foot-pounds for 6-inch through 12-inch under a working pressure of 200 psi.

801.3.3.9 No project shall be accepted by the OWNER until all valves are operational and accessible.

801.3.3.10 Before the work will be accepted, water valve GPS coordinates shall be provided on the Record Drawings. GPS coordinates obtained by a Professional Surveyor licensed in the state of New Mexico shall be taken at the valve operating nut. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate.

801.3.4 RUBBER SEATED BUTTERFLY VALVES:

801.3.4.1 Butterfly valves shall be used for sizes of 14 inches and larger, and shall comply with AWWA C504.

801.3.4.2 Only short body, Class 150B or 250B valves are acceptable. Wafer type valves are not acceptable. Valve ends may be either mechanical joint or flanged.

801.3.4.3 The rubber seat shall be field replaceable on valve sizes 24 inches and larger. The rubber seat may be mechanically retained or bonded on the disk or valve body.

801.3.4.4 Butterfly valves shall have a 3-inch square operating hub nut. Butterfly valves in vaults with valve covers at ground level shall have a hand wheel with the 3-inch nut welded to the center.

801.3.4.5 The valve shaft and disk shall be installed horizontally. The valve disc shall pivot and rotate on the horizontal axis.

801.3.4.6 The maximum input torque to open and/or close the valve shall not exceed 150 ft-lb on the wrench nut and 80 lbs. on the handwheel under a minimum working pressure of 150 psi. The butterfly operator shall be compatible with the pressure. Manual actuators shall be provided from the same manufacturer as the valve. Maximum operating torques shall be in accordance with AWWA C504.

801.3.4.7 No project shall be accepted by the OWNER until all valves are operational and accessible.

801.3.4.8 Before the work will be accepted, water valve GPS coordinates shall be provided on the Record Drawings. GPS coordinates obtained by a Professional Surveyor licensed in the state of New Mexico shall be taken at the valve operating nut. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate.

801.3.5 VALVE BOXES: Valve boxes shall consist of polymer coated steel pipe (CMP). The CMP pipe shall be polymer coated and conform to AASTO M 246 or ASTM A 742. Pipe galvanized material shall have a minimum coating thickness of 3 mils. Acceptable coating material is Trenchcoat Protective Film (Dow) or approved equal. Valve box shall be cut to accommodate the required depth. No joints shall be allowed in boxes less than 10 feet in depth. The pipe shall be manufactured in accordance with the applicable
requirements of AASTO M 245 or ASTM A 762. Pipe material shall have a 12 gauge minimum thickness and be 12 inches in diameter to accommodate the cover and lid specified herein. The pipe shall be centered and placed true to vertical around the axis of the operating nut. Valve covers and lids for re-use water shall be as shown in Standard Drawings and shall be shown on project construction plans.

801.3.6 COMBINATION AIR AND VACUUM VALVES: Air and vacuum valves shall be the type and size shown on the plans. Only combination air and vacuum valves listed on the Water Authority Approved Product List shall be used.

801.3.7 FIRE HYDRANTS

801.3.7.1 Hydrants shall be limited to those on the Water Authority Approved Product List.

801.3.7.2 Fire hydrants and their extensions shall be in accordance with AWWA C502, traffic type. Fire hydrants shall have one (1) 5 ¼-inch diameter valve opening; one (1) 6-inch mechanical joint inlet connection; two (2) 2 ½-inch hose nozzle connections; and one (1) 4 ½-inch steamer nozzle with National Standard Fire Hose Coupling Screw Threads. Fire hydrants shall have a bronze or cast iron pentagon operating nut, be designed for 150 psi working pressure service, and have a normal bury of 4 to 4 ½ feet unless field conditions require a deeper bury, in which case extensions will be used so as to bring the bottom of the break-off flange 2 to 8 inches above the top of finish grade.

801.3.7.3 The pipe fittings and fire hydrants starting at the street main and ending at the fire hydrant itself shall be lying in a line perpendicular to the water main, unless otherwise approved in writing by the Water Authority. Fire hydrants shall have no more than ½-inch variation from a vertical line between the breakaway flange and the top of the fire hydrant.

801.3.7.4 Hydrants shall be dry barrel, post-type with compression main valve closing with pressure. They shall have a field lubrication capability. Hydrants shall have a bronze seat ring threaded into a bronze drain ring, or bronze or cast iron bushing.

801.3.7.5 Exterior of hydrant, below the ground line, shall be coated with asphalt varnish, and the exterior painted from the top to a point one foot below the ground level flange, consisting of one coat rust inhibitive primer and one coat "safety yellow" enamel. The bonnet shall then be painted with a reflectorized paint using a color as close to "safety yellow" as possible.

801.3.7.6 The bottom plate of the main valve shall be epoxy coated. The shoe of the fire hydrant shall have a 6-inch mechanical joint connection and the inside shall be epoxy coated to prevent corrosion. The nozzle shall be threaded in place and retained by stainless steel locks.

801.3.7.7 Fire hydrant shall contain two drain outlets. The drain outlets shall be constructed of bronze. Hydrant shall be provided with a pentagon operating nut to open counter clockwise and shall have an anti-friction washer between the hold-down nut and the operating nut.

801.3.7.8 To prevent loss of brass operating nuts due to theft or vandalism, the following shall be included in or on the fire hydrant:

801.3.7.8.1 The bonnet must be removed in order to remove the operating nut; or

801.3.7.8.2 Use a cast iron or bronze operating nut.

801.3.7.9 Fire hydrants shall be installed at locations as shown on construction plans and in accordance with Standard Detail Drawings.

801.3.7.10 Fire hydrants shall be fully restrained in accordance with Section 130.

801.3.7.11 All fire hydrant legs shall include an isolation valve.

801.3.7.12 Hydrants shall be functional and capable of being opened or closed without difficulty following application of an operating torque of 200-foot-pounds at the operating nut.

801.3.7.13 Removal of existing fire hydrants – Fire hydrants and appurtenances shall be removed and disposed of. The pipe from the main to the fire hydrant shall be removed back to the main and the tee capped per 801.12. The CONTRACTOR shall note this on the record drawings.

801.3.7.14 Before the work will be accepted, fire hydrant GPS coordinates shall be provided on the Record Drawings. GPS coordinates obtained by a Professional Surveyor licensed in the state of New Mexico shall be taken at the valve flange. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate.

801.3.8 PRESSURE REDUCING VALVE (PRV): Pressure reducing valves shall be limited to those on the Water Authority Approved Product List. Submittals for approval shall be made to the ENGINEER and approval must be received before installation. The following items are required in the PRV:

801.3.8.1 Materials

801.3.8.1.1 Main valve

801.3.8.2 Pilot Control System:

801.3.8.2.1 Adjustment from 20 psi to 105 psi

(Revised August 2019)
SECTION 801
INSTALLATION OF WATER TRANSMISSION, COLLECTOR, AND DISTRIBUTION LINES

801.3.8.2.2 Shut-off lever on all pilot control system lines
801.3.8.2.3 Inlet flow strainer
801.3.8.2.4 Closing speed control
801.3.8.2.5 Opening speed control
801.3.8.2.6 Flow stabilizer
801.3.8.2.7 Tubing shall be stainless steel.
801.3.8.3 Sizing shall be approved by the Water Authority with calculations provided and sealed by a New Mexico Professional Engineer. Installation shall be as per the construction plans. The Water Authority shall adjust final settings on the PRV.
801.3.8.4 PRV operating criteria of elevation and normal downstream pressure setting shall be engraved on a stainless steel plate and mounted inside the vault. Numerical values shall be verified and approved by the Water Authority prior to installation of plate.
801.3.8.5 Before the work will be accepted, PRV GPS coordinates shall be provided on the Record Drawings. GPS coordinates obtained by a Professional Surveyor licensed in the state of New Mexico shall be taken at the PRV. Use the NAD 1983 NM STATE PLANE CENTRAL ZONE for x and y coordinates and NAVD 1988 for z coordinate.
801.3.9 TAPPING SLEEVES: (For other than Concrete Cylinder Pipe) Only approved, long body, fully-gasketed tapping sleeves shall be allowed. They shall be ROMAC SST Series, or JCM 432 Series, or approved equal. During installation of the tapping sleeve, the pipe shall be fully supported to support the weight of the tapping sleeve and tapping machine. Taps greater than 2/3 of the line size will not be allowed unless otherwise approved in writing by the Water Authority
801.3.9.1 Tapping sleeves of heavy welded steel bodies shall meet the following requirements:
801.3.9.1.1 Epoxy Coated
801.3.9.1.2 Bolts and nuts to be stainless steel and shall be Grade 8 minimum
801.3.9.1.3 Gaskets to be Buna-N rubber
801.3.9.1.4 Flange to be flat face steel and comply with AWWA C-207
801.3.9.1.5 Class D-ANSI 150 lbs. drilling
801.3.9.1.6 Designed to sustain an operating pressure of 150 psi
801.3.9.1.7 May be used on all water mains, 4-inch and larger
801.3.9.2 Tapping sleeves of cast iron bodies shall meet the following requirements:
801.3.9.2.1 Mechanical joint type with a working pressure of 200 psi
801.3.9.2.2 Outlet flange to be Class 125, ANSI B16.1
801.3.9.2.3 Sleeves to include side and end gaskets of Buna-N rubber
801.3.9.2.4 Eight high strength steel bolts and nuts to secure the halves of the sleeves to the pipe
801.3.9.2.5 May be used on all mains 4-inch and larger
801.3.9.3 Tapping sleeves of short sleeve cast iron shall meet the following requirements:
801.3.9.3.1 Working pressure of 150-psi
801.3.9.3.2 Outlet flange to be Class 125, ANSI B16.1
801.3.9.3.3 Outlet half to have an enclosed gasket in a groove for a pressure seal
801.3.9.3.4 Four high strength steel bolts to secure halves of tapping sleeve to pipe
801.3.9.3.5 May be used on all water mains, 4-inch and larger
801.4 CORROSION MONITORING STATIONS
801.4.1 When corrosion monitoring stations are encountered in the field or on the construction plans, the CONTRACTOR shall protect the station from damage.
801.4.2 The ENGINEER shall provide a design to the CONTRACTOR that will include relocations, if needed, adjustment to grade, and a testing plan to comply with the National Association of Corrosion Engineers (NACE) requirements.
801.4.3 The CONTRACTOR shall provide all materials, equipment, labor and supervision necessary for the completion of the installation, relocation, or adjustment, and testing. The CONTRACTOR shall employ a Corrosion Construction Supervisor, with experience in the installation of similar type systems, to supervise the corrosion monitoring facilities' installation, relocation, or adjustment. The Corrosion Construction Supervisor shall be under the direct supervision of a licensed professional Corrosion Engineer or a NACE certified Cathodic Protection Specialist. The Corrosion Construction Supervisor shall instruct the CONTRACTOR on site during the initial installation and shall revisit the site as required.
801.4.4 All construction projects within the vicinity of corrosion monitoring stations will coordinate with the Water Authority to ensure the integrity and functionality is preserved.
801.5 RECLAIMED WATER HYDRANTS

801.5.1 Any water hydrants on a reuse, reclaimed, or other non-potable water system shall be purple in color.

801.5.2 Under no circumstances shall water hydrants on reuse, reclaimed, or other non-potable water system in the public right-of-way be used for fire protection.

801.5.3 The purpose of water hydrants on the non-potable systems is for draining the waterlines and/or for water quality sampling.

801.6 WATER LINE CONNECTIONS

801.6.1 GENERAL: All new water line tie-ins to the existing water system shall be directly inspected and approved by the ENGINEER. This includes non-pressurized or pressurized connections that will result in extension of the existing system.

801.7 LOCATIONS OF WATER MAINS AND SEWER LINES

801.7.1 Unless otherwise authorized by the ENGINEER, parallel water and sewer lines shall be installed at least 10-feet apart horizontally, and the water line shall be at a higher elevation than the sewer. Separate trenches will be required in all cases (this shall be effective even though one line has been installed prior to the other), and the water line shall be at least 18-inches above the sewer. When water and sewer lines cross each other, the water line shall be at least 18-inches above the sewer. Otherwise, the sewer shall be of pressure class pipe extending between manholes, or concrete encased for 10-feet on each side of the water line as shown in the Standard Detail Drawings. The crossings shall be arranged so that the sewer joints will be equidistant and as far as possible from the water main joints.

801.7.2 Water mains shall not be constructed under walkways, sidewalks, curbs and gutters, drivepads, or similar concrete structures by tunneling underneath them. Trenchless technologies may be allowed with prior approval by the Water Authority. The CONTRACTOR may cut concrete structures or remove and replace the section of the concrete structure to the nearest full expansion joint or edge.

801.8 TRENCHING AND BACKFILLING

801.8.1 All trenching, bedding, and backfilling activities shall conform to Section 701. Compaction shall be no less than 95% of maximum density as defined by ASTM D 1557 modified proctor.

801.9 GENERAL INSTALLATION ITEMS

801.9.1 The minimum cover over distribution lines shall be 3 feet; and 4 feet of cover over transmission and well collector lines at finished grade.

801.9.2 Pipe and accessories shall be new and unused and shall be handled in such a manner as to insure delivery to the trench in sound, undamaged condition. Particular care shall be taken not to injure the pipe coating. No other pipe or material of any kind shall be placed inside of a pipe or fitting after the factory coating has been applied.

801.9.3 The interior of the pipe shall be thoroughly cleaned of foreign matter before being lowered into the trench and shall be kept clean during operations by plugging or other approved methods. When work is not in progress, open ends of pipes and fittings shall be securely closed so that no other substances will enter the pipes or fittings. Any section of the pipe found to be defective before or after laying shall be replaced with sound pipe without additional expense to the OWNER.

801.9.4 All nuts and bolts utilized in underground pipe connections shall be stainless steel, high strength cast iron or high grade, high strength steel. The full length of each section of pipe shall rest solidly upon the bed, with recesses excavated to accommodate bells and joints. Any pipe that has the grade or joint disturbed after laying shall be taken up and re-laid. Pipes shall not be laid in water or when trench or weather conditions are unsuitable for the work except by as authorized by the ENGINEER. All unconnected ends of pipes shall have a valve, plug, or cap installed on it.

801.9.5 Pipe shall be laid to line and/or grade shown on the plans or as staked in the field. Changes in horizontal or vertical alignment of the pipe at a joint shall not exceed the manufacturer’s recommended deflection for the type and size pipe being laid. When the change required is more than the recommended deflection, a fitting or several short joints of pipe shall be used.

801.9.6 When new pipe is to be connected to an existing pipe or when crossing an existing pipeline, the CONTRACTOR shall excavate the existing lines well in advance of the laying of the new pipe line to enable the ENGINEER to verify their elevation and placement and to make any changes in grade and/or alignment of the new pipeline that may be required.

801.9.7 On all push-on-joints (e.g., bell and spigot, fluid-tite, and ring-tite) the rubber gasket shall be removed, cleaned, the groove cleaned, the gasket replaced, and the bell or plain end cleaned before jointing. The gasket and the bell or plain end of the pipe to be jointed shall both be lubricated with a suitable soft vegetable soap compound to facilitate jointing. Care shall be taken to insure that neither the bell or collar, or the pipe being jointed is damaged as it is being pushed securely into place.

801.9.8 Flanged and mechanical joints shall be made with machine bolts and nuts of the proper size only. All components of these types of joints shall be cleaned before jointing. Only one (1) gasket will be permitted in a flange joint. In a mechanical joint, the plain end pipe shall be fully seated before the gasket and gland is slipped up to the bell. Nuts on both types of joints shall be tightened by alternating nuts 180-degrees
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801.9.12.1 GENERAL

801.9.12.1.1 Trace wire shall be installed on all public potable and non-potable water mains including water services, fire lines, and fire hydrant lines, sample station lines, and any other water line or portion considered public infrastructure that will be owned and maintained by the Water Authority.

801.9.12.1.2 Trace wire shall be installed in such a manner as to be able to properly trace all pipelines as applicable, without loss or deterioration of the signal.

801.9.12.2 MATERIALS: The CONTRACTOR shall submit the manufacturer’s data on materials to be furnished that indicate compliance with the specifications regarding materials used. Only products or materials listed on the Water Authority Approved Product List shall be used.

801.9.12.2.1 For open trench installation, #12 AWG high strength copper clad steel wire with a minimum 450 pound break load and minimum 30 mil HDPE insulation thickness shall be used.

801.9.12.2.2 For directional drilling/boring installation, #12 AWG high strength copper clad steel wire with a minimum 1,150 pound break load minimum 45 mil HDPE insulation thickness shall be used.

801.9.12.2.3 For pipe bursting installation, high strength 7x7 stranded copper clad steel wire with 4,700 pound break load and minimum 50 mil HDPE insulation thickness shall be used.

801.9.12.3 CONNECTORS:

801.9.12.3.1 Tee Connections: Single 3-way locking waterproof connector for 12 AWG. Connectors shall be approved by the manufacturer for direct burial.

801.9.12.3.2 Cross Connectors: Two 3-way locking waterproof connectors for 12 AWG with a short jumper wire. Connectors shall be approved by the manufacturer for direct burial.

801.9.12.3.3 Necessary Splice Connections: Single 3-way direct bury lug locking connector rated up to 50 volts filled with dielectric silicone sealant to seal out moisture and corrosion and prevent uninsulated wire exposure. Connectors shall be approved by the manufacturer for direct burial. Splices shall only be used on the main line at the end of a trace wire spool or when a Tee Connection cannot be used. The CONTRACTOR shall not cut the main line trace wire.

801.9.12.3.4 Non-locking friction fit, twist on or taped connectors are prohibited.

801.9.12.4 TEST STATIONS

801.9.12.4.1 All trace wire test stations shall be made of corrosion-resistant materials and shall be equipped with two terminals, a roadway-rated flange to prevent the test station from sinking, and a locking cast iron cap with an encapsulated magnet for ease of locating the test station. The test station shall be specifically manufactured for trace wire access/testing.

801.9.12.4.2 All grade level/in-ground test stations shall be appropriately identified with “Test Station” and with “Water” for potable water installations, and “Test” for non-potable water system installations cast into the cap and color coded per Section 801.12.6.

801.9.12.4.3 All trace wire test stations must include a manually interruptible conducting/connection link (terminal jumper) between the terminal for the trace wire connection and terminal for the grounding anode wire connection.

801.9.12.5 GROUNDING ANODE: All grounding anodes shall be made of magnesium, with a pointed end to enable direct driving into the ground, specifically manufactured for this purpose. The anode shall come factory equipped with an HDPE cap and 20 feet of factory installed #12 AWG copper clad steel wire with 30 mil HDPE coating (red) rated for direct burial at 30 volts with 21% conductivity. The wire shall have a minimum 450 pound break load.

(Revised August 2019)
801.9.12.6 COLOR CODING: The insulation of the trace wire and the color of the test station caps shall be blue for potable water lines and purple for non-potable water lines.

801.9.12.7 INSTALLATION:

801.9.12.7.1 TRACE WIRE INSTALLATION:

801.9.12.7.1.1 The trace wire shall be installed in the same trench and inside bored holes and casing with pipe during pipe installation.

801.9.12.7.1.2 The trace wire shall be securely bonded together at all wire joints with a locking waterproof connector that complies with this specification to provide electrical continuity.

801.9.12.7.1.3 Trace wire connectors shall be installed in a manner that prevents any uninsulated wire exposure.

801.9.12.7.1.4 Except for spliced-in repair or replacement connections, trace wire shall be continuous and without splices between each trace wire access point. For required splices, use splice connectors per this specification. Spliced wires must be knotted prior to being inserted in the connector to prevent separation from the connector in case the trace wires are stretched during backfilling operations.

801.9.12.7.1.5 Trace wire systems must be installed as a single continuous wire. No looping or coiling of wire is allowed.

801.9.12.7.1.6 No breaks or cuts in the trace wire or trace wire insulation shall be permitted.

801.9.12.7.1.7 Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512 Hz) signal for distances in excess of 1,500 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.

801.9.12.7.1.8 Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with connectors that comply with this specification. Taping and/or spray coating to repair trace wire or trace wire insulation shall not be allowed.

801.9.12.7.1.9 Trace wire shall be laid flat on top of the pipe and securely affixed in 6-foot intervals with tape or plastic ties to prevent shifting or damage during backfilling and excavation operations. Attach trace wire to PEXa (cross-linked polyethylene: peroxide process) service piping per the manufacturer’s recommendations with plastic (zip) ties. Do not use adhesive tape on PEXa pipe.

801.9.12.7.1.10 In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using splice connectors that comply with this specification.

801.9.12.7.1.11 Trace wire shall be attached to all appurtenances on the north or east side.

801.9.12.7.1.12 At service saddles, the trace wire shall not be placed between the saddle and the main.

801.9.12.7.1.13 For manhole or vault type structures, lay mainline trace wire continuously, by-passing around the outside of manholes/structures on the north or east side.

801.9.12.7.1.14 For main line intersections and for service line connections, the main line trace wire shall not be cut.

801.9.12.7.1.15 All main line trace wires must be interconnected at intersections, at main line tees and main line crosses. At tees, the three wires shall be joined using a single 3-way locking connector. At crosses, the four wires shall be joined using two 3-way connectors with a short jumper wire between them.

801.9.12.7.1.16 All conductive and non-conductive water and reuse service lines shall include trace wire with 3 feet of excess/slack trace wire folded in the corner of the meter box. Do not coil.

801.9.12.7.1.17 All trace wire termination points shall be terminated with a grounding anode.

801.9.12.7.1.18 For repairs and rehabilitations, trace wire shall be installed on the new line per this specification. The ends of rehabilitated/replaced pipeline segments shall be connected if existing trace wire exists or shall be terminated with a grounding anode.

801.9.12.7.1.19 If repairs are made to a line with a trace wire, Contractor must ensure trace wire is connected with an approved splice connector per this specification and test the trace to the next existing test station.

801.9.12.8 TEST STATIONS

801.9.12.8.1 Test stations shall be installed at the following locations as outlined in the Standard Detail Drawings:

801.9.12.8.1.1 At all fire hydrants on waterlines. If hydrants do not exist on a waterline, test stations shall be installed at water valves or at the stand-alone test stations.

801.9.12.8.1.2 At valves and as stand-alone test stations approximately every 1,000 feet in locations where valve spacing exceeds 1,500 feet.

801.9.12.8.2 A minimum of 6 inches of excess/slack wire is required in all trace wire test stations after meeting final elevation. Group and zip-tie excess wire. Do not coil.

801.9.12.8.3 Test stations shall be spaced approximately every 1,000 feet and shall not be spaced greater than 1,500 feet apart. Test stations do not need to be installed at each location identified above provided that the spacing between test stations does not exceed 1,500 feet.

801.9.12.9 GROUNDING
801.9.12.9.1 Trace wire must be properly grounded at all termination points on the water main and at the edge of right-of-way for water lines.

801.9.12.9.2 Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod buried at the same depth as the trace wire.

801.9.12.9.3 Where the grounding anode wire will be connected to a trace wire test station, a minimum of 6 inches of excess/slack wire is required after meeting final elevation.

801.9.12.9.4 When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire nor the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and at the same depth as the trace wire. Do not coil excess wire from grounding anode. The grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a splice connector. Install with spliced connection to main trace wire at beginning or endpoints of pipe runs, only when there is no test station box present. If test station is nearby/available, red trace wire from magnesium grounding anode shall be continuous to the terminal in the test station (no other connections or splices).

801.9.12.10 TESTING REQUIREMENTS

801.9.12.10.1 Contractor shall provide equipment for trace test and shall perform a trace test on all trace wire in the presence of the ENGINEER and WATER AUTHORITY INSPECTOR. If the trace wire is found to be not continuous upon testing, the CONTRACTOR shall repair or replace the failed segment of the wire, and shall be responsible for the cost of any trenching, backfill, repaving and other improvements necessary to complete the trace wire repair. Contractor is encouraged to test trace wire prior to backfill so any issues can be addressed prior to backfill. Passing test results shall be provided for all pipe segments. Each joint will be inspected by the ENGINEER for proper and complete closure prior to final acceptance. Flanges shall be protected by “cocoon” type protection coating of coal tar and felt in accordance with AWWA C203. When moving individual pipe section, the pipe shall be lifted using two web or belt type slings which support the pipe between the third and outside quarter points.

801.9.12.10.2 The wire shall be accessible at all access points and be identifiable between access points.

801.10 SPECIFIC PIPE LAYING REQUIREMENTS

801.10.1 Ductile iron pipe shall be installed in accordance with AWWA C600 and as herein specified.

801.10.2 Steel pipe shall be installed in accordance with AWWA C604, AWWA C206 for welded joint and as herein specified. All field-welded joints shall have one coat of coal tar enamel of 3/32-inch thickness.

801.10.3 Plastic pressure pipe shall be installed in accordance with AWWA M23, C900, C605 and/or manufacturer's printed recommendations, whichever is applicable. Trenching, excavation and backfill is specified in Section 701. Compaction shall be no less than 95% of maximum density as defined by ASTM D 1557 modified proctor. A reference mark (a distinct circumferential line) is placed on the pipe's spigot by the manufacturer to indicate the correct depth of the spigot penetration into the pipe's gasket joint. If the pipe is seated too deep or too shallow, the pipe may buckle or separate due to thermal expansion / contraction, therefore particular attention shall be exercised when jointing pipe. The reference mark must be showing and not farther than ½-inch from the leading edge of the bell. The CONTRACTOR shall verify that the manufacturer's reference mark is correct per manufacturer's literature.

801.10.4 All concrete cylinder pipe shall have two small bond wires of low resistance, or other approved method, welded across the joint to make the joint electrically continuous. Where rigid joints are specified, they shall be provided as specified herein. The outside joint recess shall be completely filled with a rich low shrinkage cement grout. The concrete surface in contact with the joint mortar shall be moistened with water just prior to pouring the joint recess. The mortar shall be poured into the joint recess against a water proof paper or cloth diaper laid around and lapping the outside field joint. The diaper shall completely and snugly enclose the joint recess, being held in place by metal box strapping or wire. The mortar shall be poured into an opening slightly to one side on the top of the pipe and rodded by a flexible wire rod onto place until it appears on the opposite side completely. After the joint recess has been filled with mortar, adjoining pipe section shall not be disturbed. After the joint has been made, the concrete lining surfaces of the joint shall be moistened and the interior recess tightly jointed and troweled flush and smooth with the inside pipe surface. Grout for painting the interior joints shall be of a stiff consistency and shall have low shrinkage characteristics. In sizes of pipe smaller than 24 inches, the mortar shall be buttered all around the shoulder inside the bell before the spigot is entered. A backing-up tool, such as an inflated rubber ball wrapped with burlap, shall be pulled through the joint to compact the mortar, completely fill the inside annular space and wipe off the excess mortar. Each joint will be inspected by the ENGINEER for proper and complete closure prior to final acceptance. Flanges shall be protected by “cocoon” type protection coating of coal tar and felt in accordance with AWWA C203. When moving individual pipe section, the pipe shall be lifted using two web or belt type slings which support the pipe between the third and outside quarter points.

801.10.5 All fittings and valves shall be installed as per the type of joint as stated herein and/or as shown on the plans.

801.10.6 All couplings, clamps, sleeves, etc. shall be installed as per the manufacturer's printed recommendations and as approved by the ENGINEER. The CONTRACTOR shall properly restrain all appurtenances as necessary.
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801.10.7 All water lines installed as part of a reuse, reclaimed, or other non-potable water system shall be purple in color or shall be encased in purple PVC wrap.

801.11 CUTTING: The cutting of any type of pipe shall be done as per the manufacturer’s printed recommendations, as approved by the ENGINEER. Care shall be taken in cutting any pipe that has an internal and/or external lining or coating.

801.12 BLOCKING AND Restrained JOINTS
801.12.1 All restrained joints shall be by mechanical means unless directed or approved otherwise by the ENGINEER.

801.12.2 All tees and bends shall be restrained by mechanical means. Valves in runs shall be mechanically restrained. Where rigid joints are called for on concrete cylinder pipe, the joints shall be flanged or field welded bell and spigot joints in accordance with the manufacturer’s recommendation.

801.12.3 All caps and plugs on dead end lines shall be mechanically restrained when feasible. Blocking may also be required when adequate restrain length is not available.

801.12.4 Where restrained joints on ductile iron pipe or PVC pipe are called for, the mechanical restraining system employed shall conform to the recommendations of the pipe manufacturer.

801.13 RESTRAINING JOINTS FOR CONCRETE CYLINDER PIPE
801.13.1 Restrained joints in concrete cylinder pipe for thrust restraint shall be produced by continuous welding the pipe joints.

801.14 CONNECTIONS TO EXISTING CONCRETE CYLINDER PIPE
801.14.1 OBJECTIVE: The intent of this Subsection is to establish procedural and design criteria for making connections to existing concrete cylinder pipe for water distribution line extensions, and will be applicable to 4-inch and larger size connections.

801.14.2 NEW WATER LINES: Non-factory taps are prohibited.

801.14.3 EXISTING WATER LINES
801.14.3.1 New connections to existing concrete cylinder pipe must be approved in writing by the Water Authority Field Division Manager. Hot taps and service connections will not be allowed. The requester shall provide the following information:

801.14.3.1.1 Justification for the connection
801.14.3.1.2 Project name and number
801.14.3.1.3 Date connection to be performed

(Minimum 30-day notice)

801.14.3.1.4 Name of the CONTRACTOR who will be installing the connection
801.14.3.1.5 Scheduling of connections is subject to the moratorium requirements of the Water Authority
801.14.3.2 The CONTRACTOR shall coordinate the work with the Water Authority Field Division before commencing work. The Water Authority Field Division shall inspect and approve the entire installation of the connection prior to backfilling and returning to service.

801.15 Not used

801.16 HYDROSTATIC TESTS:
801.16.1 The CONTRACTOR shall be required to perform hydrostatic tests in all water mains, laterals, dead ends, and service lines in accordance with AWWA C600. The test shall be conducted in the presence of the ENGINEER, or his authorized representative. The testing of the lines shall be done without being connected to existing lines. The CONTRACTOR shall provide all temporary plugs required. Water used for disinfecting may be used for hydrostatic testing. Leakage through connections to the existing system, leaks in the existing lines, or leaking existing valves under the test pressure will invalidate the test. The lines shall be tested at 150 psi, or 1.5 times the normal working pressure of the line, whichever is greater, for not less than two hours. All taps, gauges, and necessary equipment shall be provided by the CONTRACTOR as approved by the ENGINEER, however, the ENGINEER may utilize gauges provided by himself if he so elects. Each section of the new line between valves shall be tested to demonstrate that each valve will hold the test pressure. No installed pipe shall be accepted if the leakage is greater than that determined by the Hydrostatic Test sheet calculations. If the total leakage is less than the allowable, the line can be accepted. All visible leaks shall be repaired regardless of the amount of leakage and the test re-conducted.

801.16.2 The CONTRACTOR shall submit a testing plan to the ENGINEER for approval. In cases where a new main is being connected to an existing main without the installation of a new valve, the end of the new main shall be temporarily capped and restrained and a hydrostatic test performed. Hydrostatic tests should not be made such that an existing valve or existing main is included in the test section. The Hydrostatic Test Sheet in this Section is the standard form which must be completed at the time of the test, signed by the ENGINEER and delivered to the Water Authority prior to acceptance of the Project

801.17 DISINFECTING, FLUSHING, AND BACTERIA TESTING OF WATER LINES:
801.17.1 New water lines and temporary water
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mains (shoo-fly) shall be installed in such a manner as to not require cleaning by flushing. This shall require capping stockpiled line, capping lines at night and any other time work is not in progress, visual inspection of interior of lines, and cleaning as necessary prior to placing in the trench. Every effort shall be made to prevent the entry of dirt and debris into pipelines under construction.

801.17.1.1 Mains shall be disinfected in accordance with AWWA C651 with chlorine liquid solution, which shall be added by an approved method at one end of the lines as water is drawn through the lines and service connections. The chlorine solution shall remain in the line for at least 24 hours. The lines shall then be flushed until the chlorine residual is equal to the normal residual in the existing system or at 0.5 parts per million for un-chlorinated water. Dry chlorine shall not be used for disinfection of water lines. The flushed water shall be disposed of by the CONTRACTOR appropriately. Should results of the bacteriological analysis be unsatisfactory, the disinfection procedure shall be repeated.

801.17.1.2 The CONTRACTOR shall be granted three free volumes of water for testing, disinfecting, and flushing the new installation. All water used for testing, disinfecting, and flushing shall be metered. If additional water is needed for these purposes, the water shall be paid for by the CONTRACTOR at the current water rates. An approved backflow prevention system shall be used when withdrawing water from any waterlines and hydrants. Unmetered connection to the water system shall not be used for providing water for disinfecting, testing, or flushing.

801.17.1.3 Water Authority or the ENGINEER will collect the water sample to test the water in the existing lines at the point of delivery for assurance of clean and potable water. The water in the existing lines will be used for testing and flushing.

801.18 INTERFERENCE WITH SERVICE AND SCHEDULE OR WORK

801.18.1 The CONTRACTOR shall obtain the permission of the ENGINEER before making any connections with existing mains. The required operation of existing valves will be performed by the Water Authority as per Section 18.

801.18.2 Work shall be started after authorization from the Water Authority and the ENGINEER and shall be completed in a prompt efficient manner in coordination and cooperation with other utilities concerned.

801.18.3 The CONTRACTOR shall be required to arrange his construction to maintain continuous service to water users, from existing facilities, to the fullest extent possible. CONTRACTOR shall, at all times, withhold construction work where any conflicts in the service requirements occur.

801.19 NOTIFICATION OF COMPLETION:

801.19.1 The CONTRACTOR shall notify the ENGINEER, in writing, when the CONTRACTOR has completed construction of a water line. This notification should be submitted immediately upon completion; the water line shall not be placed in service by the Water Authority before the sewer service and the paving, if applicable, are in place and until the Water Authority has received and accepted all adequate documentation submittals per 801.21. Water Authority inspection shall consider, on a case by case basis, exceptions for fire protection purposes.

801.20 VALVE BOX REHABILITATION

801.20.1 The rehabilitation of existing valve boxes as shown on the plans or as authorized by the ENGINEER shall include the following:

801.20.1.1 Removing and disposing the existing valve box, concrete collar, ring, and cover and installing the new type box, concrete collar, ring, and cover.

801.20.1.2 Installation of a new concrete collar is required in paved and unpaved areas. Main line pipe size and direction of the line shall be scribed on the collar.

801.20.1.3 Install a new electronic marker device.

801.20.1.4 Removal, disposal, and replacement of the pavement

801.20.1.5 Excavation, backfill, and compaction

801.20.1.6 All materials, labor, and equipment necessary to do the work

801.20.1.7 Trace wire test stations shall be protected in place from damage. Any damage to this system shall be repaired by the Contractor at no cost to the Water Authority.

801.20.2 The work under this item shall be constructed per the Standard Detail Drawings

801.21 DOCUMENTATION SUBMITTALS

801.21.1 At the time of the final inspection, the following documentation will be submitted to the ENGINEER and to the Water Authority:

801.21.1.1 Hydrostatic test data of the new water line system

801.21.1.2 Microbiological test reports which were taken at representative locations along the system

801.21.1.3 All valves at that time shall be in the open position, unless otherwise authorized by the ENGINEER and Water Authority
801.21.1.4 A marked-up set of construction drawings reflecting as-built conditions. This does not supplant the requirements for record or as-built drawings.

801.22 MEASUREMENT AND PAYMENT

801.22.1 PIPE: Payment for all sizes and types of pipe shall be made on the basis of measurement per linear foot, including the length of fittings, valves, etc. The contract unit price of pipe shall include all jointing and coupling materials necessary for its installation and connections to other sections of pipe, except for fittings, valves or other appurtenances. The cost of hydrostatic testing, flushing and disinfecting of new water lines shall be included in the contract unit price for the item in place. Electronic Marking Devices, Pipe locator tape, and trace wire system for pipe shall be included in the contract unit price of the pipe. Joint restraint shall be paid for separately.

801.22.2 DEPTH OF TRENCH:

801.22.2.1 The contract unit price for pipe and appurtenances in all cases shall include the trenching, installation, and compacted backfilling for trench cuts as specified in Section 701.

801.22.2.2 Payment for additional excavation deeper than the specified limits shall be made on the contract unit price per vertical foot per linear foot, and shall include trenching, installation of pipe and appurtenances, and compacted backfilling in the deeper trench.

801.22.3 REMOVAL AND DISPOSAL OF PIPE

801.22.3.1 The payment for removal shall be made on a unit price per linear foot; there shall be no additional cost to the OWNER for disposal.

801.22.3.2 The payments for removal and disposal shall include trenching and compacted backfilling.

801.22.4 CAST IRON AND DUCTILE IRON FITTINGS:

801.22.4.1 All cast iron and ductile iron fittings shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint ends fitting for the type and size of fitting used as specified in AWWA C110, regardless of the type of ends on the fitting installed. The contract unit price per pound of fittings shall include all gaskets, glands, bolts, and nuts required. No separate payment will be made for these items.

801.22.4.2 When the CONTRACTOR installs a Water Authority-furnished fitting and replaces that fitting in the Water Authority’s inventory, the CONTRACTOR shall be paid the full contract unit price of that fitting as outlined above. If the CONTRACTOR does not replace the fitting in the Water Authority’s inventory, the payment to the CONTRACTOR will be at the contract unit price of the fitting less the cost of the fitting itself.

801.22.4.3 Fitting Insertion: The insertion of a fitting into an existing pipeline shall be measured and paid for at the contract unit price per pound based on weights of an all mechanical joint end fitting and if required on all mechanical joint connecting piece (coupling) of the type fitting and size used, as specified in AWWA C110, regardless of the type of ends on the fitting and coupling installed. This payment shall include all compensation for the excavation, cutting and removal of the existing pipe, installation of the fitting and coupling, if required, the re-cutting of the existing pipe or new pipe installed between the fitting and coupling, and backfill and compaction complete in place. In addition to the payment for the fitting insertion, the CONTRACTOR shall be paid for each non-pressurized connection and if pavement, curb and gutter, sidewalk, drive pad, etc., are removed, these items will be paid for as part of the appropriate item.

801.22.5 REMOVAL AND DISPOSAL OF PIPE AND APPURtenances:

801.22.5.1 The payment for removal and disposal shall include trenching and compacted backfilling.

801.22.6 CONCRETE CYLINDER FITTINGS: Concrete cylinder pipe fittings, such as flanged outlets, bends, reducers, etc., shall be considered as incidental to the contract unit price for installation of the pipe, as shown on the construction plans.

801.22.7 COUPLINGS: The measurement for steel or cast iron couplings shall include payment for all gaskets, bolts, and incidental materials as may be needed for its complete installation. Payment shall be made on the contract unit price per each size of coupling required.

801.22.8 STEEL FITTINGS: Steel fittings shall only be used when authorized by the ENGINEER and when needed to connect to an existing steel water line. Measurement and payment for steel fittings, when authorized, shall be made at the contract unit price per pound based on weights of an all mechanical joint ends fitting of the type fitting and size used, as specified in AWWA C110. This payment shall include all fabrication and welding required on the fitting.

801.22.9 VALVE AND VALVE BOXES:

801.22.9.1 Valves shall be measured and paid for at the contract unit price per each size of valve. The contract unit price for valves 24-inch and larger shall include the bypass valve, fittings and piping, complete in place.

801.22.9.2 Valve Boxes shall be measured and paid for at the contract unit price per each per type of valve box. Payment shall include the polymer coated corrugated metal pipe, new ring, cover, new concrete
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pad, and new EMD complete in place.

801.22.10 FIRE HYDRANTS

801.22.10.1 Fire Hydrants shall be measured and paid for at the contract unit price per each per depth of bury. Payment shall include excavation, gravel drain pocket, mechanical restraining system, backfilling, and compaction complete in place.

801.22.10.2 Measurement and payment for removal of existing fire hydrant shall be per each and shall include excavation and salvage or disposal of the existing fire hydrant, valve and pipe back to the water main, capping the tee, backfilling and compaction as required for the location of the fire hydrant and appurtenances. Removal and replacement of existing paving, curb, gutter, and sidewalk will be covered under those bid items.

801.22.11 VALVE BOX ADJUSTMENTS:

801.22.11.1 Valve box adjustment using the adjustment collar and insert shall be measured and paid for per each complete in place including the concrete pad and EMD. If existing ring and cover do not match current approved standards, a new ring and cover that does comply with the Standard Specifications shall be installed and the cost shall be considered incidental to the valve box adjustment.

801.22.11.2 When the adjustment height required on a valve box exceeds the height of the adjustment collar or the valve box has been previously adjusted, the valve box shall be rehabilitated. Measurement and payment shall be made as specified under Valve Box Rehabilitation.

801.22.12 WATER LINE CONNECTIONS:

801.22.12.1 Non-pressurized Connections: Non-pressurized connections shall be measured and paid for at the contract unit price per each for any size or type of pipe, complete in place, which shall include any extra excavation required, shut-off coordination, the removal of any caps or plugs or the cutting of the existing pipe any number of times required to make the connection, drainage plan (if required), pumping or handling of the water, backfilling and compaction. Fittings shall be measured and paid for per pound as specified herein, including all types of couplings.

801.22.12.2 Pressurized Connections: Pressurized connections shall be measured and paid for at the contract unit price per each per location shown on the plans, complete in place, which shall include excavation, the cleaning or removal of existing pipe coatings and coverings, hydrostatic testing, the tapping, any grouting required, backfilling and compaction. The installation of the tapping sleeve and gate valve is to be paid under separate item or as indicated on the plans.

801.22.12.3 Connection to Steel Water Lines: All connections to existing steel water lines shall be made by using a transition coupling. The measurement and payment for this type of connection shall be made per pound of fitting for a Mechanical-Joint Connecting Piece of the size used based on the weights specified in AWWA C110.

801.22.12.4 Waterline Lowering: Where specified on construction drawings and provided on the project bid tab, a waterline lowering shall be a separate bid item and shall not be measured nor paid for as a non-pressurized or pressurized connection.

801.22.13 THRUST RESTRAINTS:

801.22.13.1 CONCRETE BLOCKING: When concrete blocking is used, as authorized by the ENGINEER, the blocking shall be measured and paid for at the contract unit price per cubic yard placed to the neat lines shown on the plans or per the Standard Detail Drawings.

801.22.13.2 RESTRAINING JOINTS FOR CONCRETE CYLINDER PIPE: Measurement and payment for this item shall be at the contract unit price per linear inch of circumferential welded, complete in place, including protective coating of the weld.

801.22.13.3 MECHANICALLY RESTRAINED JOINTS: Mechanically restrained joint assemblies shall be measured and paid for at the contract unit price per each assembly per size of the pipe per each type (pipe to pipe, pipe to mechanical joint, pipe to fitting, etc.) complete in place.

801.22.13.4 VALVE ANCHORAGE: No separate measurement nor payment shall be made for valve anchorage as per Standard Detail Drawing. The cost of this work shall be included with the cost of the valve.

801.22.14 PRESSURE REDUCING VALVE (PRV): Measurement and payment for furnishing and installing a PRV shall be made at the contract unit price per each per size, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, gauges, equipment and material required for the excavation, the PRV, all bypass piping, fittings and valves both inside and outside the structure, the structure, backfilling and compaction.

801.22.15 AIR RELEASE VALVE (ARV): Measurement and payment for furnishing and installing an ARV shall be made at the contract unit price per each per size of ARV, complete in place as shown on the plans or in the Standard Detail Drawings. The payment shall include all labor, equipment and materials required for the excavation, ARV, piping, fittings, gate valve, structure, backfilling, compaction, EMD, valve box, and concrete collar.

801.22.16 VALVE BOX REHABILITATION: Valve box rehabilitation shall be measured and paid for at the

(Revised August 2019)
contract unit price per each, complete in place which shall include the removal of the existing valve box, excavation, the new valve box installed, EMD, backfilling, compaction and the installation of the concrete collar. If existing ring and cover do not match current approved standards, a new ring and cover that does comply with the Standard Specifications shall be installed and the cost shall be considered incidental to the valve box rehabilitation.

801.22.17 CONCRETE STRUCTURES: The removal and replacement of concrete structures such as sidewalks, drive pads, wheelchair ramps, and curb and gutters, as required for the installation of water lines shall be measured and paid for as specified in Section 340 and 343.

801.22.18 BEDDING MATERIAL: No separate measurement nor payment shall be made for bedding material required when shown on the plans or when required due to the type of pipe supplied by the CONTRACTOR. The cost of the bedding material shall be included in the unit price of the pipe. If bedding material is not required by the conditions above, but is required due to the conditions encountered during construction, then the bedding material shall be measured and paid for as specified in Section 701.

801.22.19 SURPLUS MATERIALS: No separate measure nor payment will be made for the removal and disposal of surplus material generated by the pipe, bedding material or the use of lean fill.

801.22.20 CORROSION MONITORING STATION ADJUSTMENTS TO FINISHED GRADE

801.22.20.1 Corrosion monitoring station adjustments to grade shall be measured and paid per each complete in place including electrical connections or extensions needed, pea gravel, concrete collar, and traffic rated box and cover to comply with current standard detail drawings.

801.22.21 TRACE WIRE: All work associated with the installation of the trace wire and system shall be considered incidental to the installation cost of the pipeline being traced.
SECTION 801

INSTALLATION OF WATER TRANSMISSION, COLLECTOR, AND DISTRIBUTION LINES

Test No.: __________  HYDROSTATIC TEST

PROJECT NAME: ____________________________  DATE: ________________

PROJECT NUMBER: ______________  CONTRACTOR: ________________________________

Location: ____________________________________________________________________________

PIPE MATERIAL: _______DIP      ____PVC   _______CCP      _______Fabricated Steel

Test: Length (S) = __________ ft.
      Size (D) = __________ inches
      Pressure (P) = __________ psi - gauge (average test pressure during the hydrostatic test)
      Leakage Allowed (L_{ALL}) = __________ gal / hr (L_{ALL} = \sqrt{SDP / 133,200} per AWWA C600-99)

Basis: Only resilient seated gate valves and/or rubber seated butterfly valves are used. No metal seated valves are allowed.

Total Leakage Allowed for 2 hour Test Period: \[ L_{ALL} \times 2 \text{ hours} = \] __________ gallons

Actual Amount of Water ADDED to maintain 150 psi ± 5 psi for 2 hours = ___________ gallons

If actual amount of water added is LESS THAN total leakage allowed, test PASSED
If actual amount of water added is GREATER THAN total leakage allowed, test FAILED

___ Test Passed  ___ Test Failed

Contractor  Date  Inspector  Date

Project Manager  Date

COMMENTS: ____________________________________________________________________________

______________________________________________________________________________________

______________________________________________________________________________________

Note: Sec Section 801.16 for the Specification for test procedures.
901.1 GENERAL:
The construction items, specified in this section, are common to sanitary sewer collector and interceptor facilities.

901.2 REFERENCES
901.2.1 ASTM
D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
D 3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
F 679 Standard Specification for Poly (Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
F 794 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
901.2.2 (intentionally left blank)
901.2.3 This publication per SECTIONS:
121 Plastic Pipe
131 Fiberglass Pipe
701 Trenching, Excavation and Backfill

901.3 MATERIALS
901.3.1 PIPE:
Sewer line pipe and fittings shall be as specified in other sections, as follows:

<table>
<thead>
<tr>
<th>Section</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>121</td>
<td>Plastic Pipe</td>
</tr>
<tr>
<td>131</td>
<td>Fiberglass Pipe</td>
</tr>
<tr>
<td>701</td>
<td>Trenching, Excavation and Backfill</td>
</tr>
</tbody>
</table>

901.4 CERTIFICATION:
The OWNER / ENGINEER will be supplied with a certification on each item or type of material required in the sewer line, as to that item meeting the specifications and/or the reference specifications before that item is installed.

901.5 INSTALLATION
901.5.1 GENERAL
901.5.1.1 Pipe and appurtenances shall be new and unused. The type of pipe to be installed shall be as approved by these specifications or unless otherwise shown on the project construction drawings. Pipe and appurtenances shall be handled in such a manner as to ensure delivery to the trench in sound, undamaged condition. Particular care shall be taken to prevent damage to any pipe coating.

901.5.1.2 The interior of the pipe shall be thoroughly cleaned of foreign material before being lowered into the trench and shall be kept clean during construction operations. When work is not in progress, the open ends of pipe shall be securely closed so that no foreign materials will enter the pipe. Any section of pipe found to be defective before or after installation, shall be replaced with sound pipe, or repaired in a manner satisfactory to the ENGINEER, without additional expense to the OWNER.

901.5.1.3 The CONTRACTOR shall install a plug in the new sewer at any point of connection to an existing system. The CONTRACTOR shall not flush or otherwise discharge any flow into an existing system unless approved in writing by the ENGINEER and Water Authority.

901.5.1.3.1 The plug shall remain in place until the ENGINEER or Water Authority authorizes its removal in writing. Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of the work.

901.5.1.3.2 The CONTRACTOR shall certify in writing the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal. The Water Authority assumes no liability for damages caused by plugs inadvertently left in the line by the Contractor.

901.5.1.4 Pipe shall be laid to line and grade as shown on the project construction plans. The bedding of the trench shall be graded and prepared to provide a firm and uniform bearing throughout the entire length of the pipe barrel. Suitable excavation shall be made to receive the bell of the pipe and the joint shall not bear upon the bottom of the trench. All adjustment to the line and grade shall be made by scraping away or filling in with pipe zone material under the body of the pipe, and not by wedging or blocking. When connections are to be made to any existing manhole, pipe, or other improvement, the actual elevation or position of which cannot be determined without excavation, the CONTRACTOR shall excavate for and expose the existing improvement before laying the connecting pipe or conduit. When existing underground improvements may reasonably be expected to conflict with the line or grade established for the new sewer line, the ENGINEER shall request the CONTRACTOR to excavate as necessary to expose and locate such potentially conflicting underground improvements prior to laying the new pipe. Any adjustment in line or grade which may be necessary to accomplish the intent of the construction plans will be made, and the CONTRACTOR will be paid for any additional work resulting from such change in line or grade in the manner provided for in the General Conditions.

901.5.1.5 Connections to existing sanitary sewer manholes shall be made by core drilling through the manhole wall. The CONTRACTOR shall take care to avoid unnecessary damage to the existing manhole.

(Revised August 2019)
901.5.1.6 Pipe shall be laid upgrade in a continuous operation from structure to structure, with the bell end of the pipe upgrade unless otherwise permitted by the ENGINEER.

901.5.1.7 Sanitary sewer mains shall not be constructed under walkways, sidewalks, curbs and gutters, drive pads, or similar concrete structures by tunneling underneath them. The CONTRACTOR will remove the section of the concrete structure to the nearest full expansion joint or edge.

901.5.1.8 Prior to completely backfilling the sewer excavation, install a green metalized detectable warning tape 12” to 18” below finished grade. The tape shall be detectable with a standard metal pipe locator. The tape shall be a minimum of 2 inches wide and inscribed at 10-foot intervals with the words, “CAUTION BURIED SEWER LINE BELOW”. The tape shall be constructed of material that is impervious to alkalis, acids, chemical reagents, and solvents found in the soils.

901.5.1.9 TRACE WIRE

901.5.1.9.1 GENERAL

901.5.1.9.1.1 Trace wire shall be installed on all public sanitary sewer interceptor, collector, and any other lines considered public infrastructure that will be owned and maintained by the Water Authority.

901.5.1.9.1.2 Trace wire shall be installed in such a manner as to be able to properly trace all pipelines as applicable, without loss or deterioration of the signal.

901.5.1.9.2 MATERIALS: The CONTRACTOR shall submit the manufacturer’s data on materials to be furnished that indicate compliance with the specifications regarding materials used. Only products or materials listed on the Water Authority Approved Product List shall be used.

901.5.1.9.2.1 For open trench installation, #12 AWG high strength copper clad steel wire with a minimum 450 pound break load and minimum 30 mil HDPE insulation thickness shall be used.

901.5.1.9.2.2 For directional drilling/boaring installation, #12 AWG high strength copper clad steel wire with a minimum 1,150 pound break load minimum 45 mil HDPE insulation thickness shall be used.

901.5.1.9.2.3 For pipe bursting installation, high strength 7x7 stranded copper clad steel wire with 4,700 pound break load and minimum 50 mil HDPE insulation thickness shall be used.

901.5.1.9.3 CONNECTORS:

901.5.1.9.3.1 Tee Connections: Single 3-way locking waterproof connector for 12 AWG. Connectors shall be approved by the manufacturer for direct burial.

901.5.1.9.3.2 Cross Connectors: Two 3-way locking waterproof connectors for 12 AWG with a short jumper wire. Connectors shall be approved by the manufacturer for direct burial.

901.5.1.9.3.3 Necessary Splice Connections: Single 3-way direct bury lug locking connector rated up to 50 volts filled with dielectric silicone sealant to seal out moisture and corrosion and prevent uninsulated wire exposure. Connectors shall be approved by the manufacturer for direct burial. Splices shall only be used on the main line at the end of a trace wire spool or when a Tee Connection cannot be used. The CONTRACTOR shall not cut the main line trace wire.

901.5.1.9.3.4 Non-locking friction fit, twist on or taped connectors are prohibited.

901.5.1.9.4 TEST STATIONS

901.5.1.9.4.1 All trace wire test stations shall be made of corrosion-resistant materials and shall be equipped with two terminals, a roadway-rated flange to prevent the test station from sinking, and a locking cast iron cap with an encapsulated magnet for ease of locating the test station. The test station shall be specifically manufactured for trace wire access/testing.

901.5.1.9.4.2 All grade level/in-ground test stations shall be appropriately identified with “Test Station” and with “Sewer” cast into the cap and color coded Green.

901.5.1.9.4.3 All trace wire test stations must include a manually interruptible conducting/connection link (terminal jumper) between the terminal for the trace wire connection and terminal for the grounding anode wire connection.

901.5.1.9.5 GROUNDING ANODE: All grounding anodes shall be made of magnesium, with a pointed end to enable direct driving into the ground, specifically manufactured for this purpose. The anode shall come factory equipped with an HDPE cap and 20 feet of factory installed #12 AWG copper clad steel wire with 30 mil HDPE coating rated for direct burial at 30 volts with 21% conductivity. The wire shall have a minimum 450 pound break load.

901.5.1.9.6 COLOR CODING: The insulation of the trace wire and the color of the test station caps shall be Green.

901.5.1.9.7 INSTALLATION

901.5.1.9.7.1 TRACE WIRE INSTALLATION

901.5.1.9.7.1.1 The trace wire shall be installed in the same trench and inside bored holes and casing with pipe during pipe installation.
901.5.1.9.7.1.2 The trace wire shall be securely bonded together at all wire joints with a locking waterproof connector that complies with this specification to provide electrical continuity.

901.5.1.9.7.1.3 Trace wire connectors shall be installed in a manner that prevents any uninsulated wire exposure.

901.5.1.9.7.1.4 Except for spliced-in repair or replacement connections, trace wire shall be continuous and without splices between each trace wire access point. For required splices, use splice connectors per this specification. Spliced wires must be knotted prior to being inserted in the connector to prevent separation from the connector in case the trace wires are stretched during backfilling operations.

901.5.1.9.7.1.5 Trace wire systems must be installed as a single continuous wire. No looping or coiling of wire is allowed.

901.5.1.9.7.1.6 No breaks or cuts in the trace wire or trace wire insulation shall be permitted.

901.5.1.9.7.1.7 Trace wire installation shall be performed in such a manner that allows proper access for connection of line tracing equipment, proper locating of wire without loss or deterioration of low frequency (512 Hz) signal for distances in excess of 1,500 linear feet, and without distortion of signal caused by multiple wires being installed in close proximity to one another.

901.5.1.9.7.1.8 Any damage occurring during installation of the trace wire must be immediately repaired by removing the damaged wire, and installing a new section of wire with connectors that comply with this specification. Taping and/or spray coating to repair trace wire or trace wire insulation shall not be allowed.

901.5.1.9.7.1.9 Trace wire shall be laid flat on top of the pipe and securely affixed in 6-foot intervals with tape or plastic ties to prevent shifting or damage during backfilling and excavation operations.

901.5.1.9.7.1.10 In occurrences where an existing trace wire is encountered on an existing utility that is being extended or tied into, the new trace wire and existing trace wire shall be connected using splice connectors that comply with this specification.

901.5.1.9.7.1.11 Not used.

901.5.1.9.7.1.12 At service saddles, the trace wire shall not be placed between the saddle and the main.

901.5.1.9.7.1.13 Lay the mainline trace wire continuously by-passing around the outside of manholes, vaults and other structures on the north or east side.

901.5.1.9.7.1.14 For main line intersections, the main line trace wire shall not be cut.

901.5.1.9.7.1.15 All main line trace wires must be interconnected at intersections, at main line tees and main line crosses. At tees, the three wires shall be joined using a single 3-way locking connector. At crosses, the four wires shall be joined using two 3-way connectors with a short jumper wire between them.

901.5.1.9.7.1.16 All trace wire termination points shall be terminated with a grounding anode.

901.5.1.9.7.1.17 For repairs and rehabilitations, trace wire shall be installed on the new line per this specification. The ends of rehabilitated/replaced pipeline segments shall be connected if existing trace wire exists or shall be terminated with a grounding anode.

901.5.1.9.7.1.18 If repairs are made to a line with a trace wire, Contractor must ensure trace wire is connected with an approved splice connector and test the trace to the next existing test station.

901.5.1.9.8 TEST STATIONS

901.5.1.9.8.1 Test stations shall be installed at the following locations as outlined in the Standard Detail Drawings:

901.5.1.9.8.1.1 At sanitary sewer manholes and sanitary sewer wet wells;

901.5.1.9.8.1.2 At sanitary sewer force main valves;

901.5.1.9.8.1.3 At sanitary sewer vacuum valves;

901.5.1.9.8.2 A minimum of 6 inches of excess/slack wire is required in all trace wire test stations after meeting final elevation. Group and zip-tie excess wire. Do not coil.

901.5.1.9.8.3 Test stations shall be spaced approximately every 1,000 feet and shall not be spaced greater than 1,500 feet apart. Test stations do not need to be installed at each location identified above provided that the spacing between test stations does not exceed 1,500 feet.

901.5.1.9.9 GROUNDING

901.5.1.9.9.1 Trace wire must be properly grounded at all termination points.

901.5.1.9.9.2 Grounding of trace wire shall be achieved by use of a drive-in magnesium grounding anode rod buried at the same depth as the trace wire.

901.5.1.9.9.3 Where the grounding anode wire will be connected to a trace wire test station, a minimum of 6 inches of excess/slack wire is required after meeting final elevation.
901.5.1.9.9.4 When grounding the trace wire in areas where the trace wire is continuous and neither the mainline trace wire nor the grounding anode wire will be terminated at/above grade, install grounding anode directly beneath and at the same depth as the trace wire. Do not coil excess wire from grounding anode. The grounding anode wire shall be trimmed to an appropriate length before connecting to trace wire with a splice connector. Install with spliced connection to main trace wire at beginning or endpoints of pipe runs, only when there is no test station box present. If test station is nearby/available, red trace wire from magnesium grounding anode shall be continuous to the terminal in the test station (no other connections or splices).

901.5.1.9.10 TESTING REQUIREMENTS

901.5.1.9.10.1 Contractor shall provide equipment for trace test and shall perform a trace test on all trace wire in the presence of the ENGINEER and WATER AUTHORITY INSPECTOR. If the trace wire is found to be not continuous upon testing, the CONTRACTOR shall repair or replace the failed segment of the wire, and shall be responsible for the cost of any trenching, backfill, repaving and other improvements necessary to complete the trace wire repair. Contractor is encouraged to test trace wire prior to backfill so any issues can be addressed prior to backfill. Passing test results shall be provided for all pipe segments within the Engineer of Record’s as-built data and plan set. To pass the continuity test, the following conditions must be met:

901.5.1.9.10.1.1 Trace test shall be performed by using a metallic locator with audible tone and numeric values for certification of the facility locations and shall be identifiable between access points.

901.5.1.9.10.1.2 The wire shall be accessible at all access points and be identifiable between access points.

901.5.2 PLASTIC PIPE INSTALLATION:

901.5.2.1 Plastic sewer pipe shall be connected and placed in the trench in accordance with the manufacturer’s recommendations. Where a conflict arises with this Specification, this Specification shall control. Trenching, embedment, and backfill shall be as specified in Section 701.

901.5.2.2 The reference mark (a distinct circumferential line) is placed on the pipe’s spigot end by the manufacturer to indicate the correct depth of spigot penetration into the pipe gasket joint. If the pipe is seated too deep or too shallow, the pipe may buckle or separate due to thermal expansion/contraction. Spigot penetration shall be within ¼-inch of the manufacturer’s recommended mark.

901.5.2.3 For plastic or fiberglass pipe connection to manholes the CONTRACTOR shall install an appropriately sized and approved press seal gasket. The gasket shall be installed per manufacturer’s directions. No direct payment shall be made for this item. This cost shall be incidental to the pipe’s bid item.

901.5.2.4 Not less than thirty (30) days after the installation and backfilling of plastic or fiberglass sewers, including any service connections, the CONTRACTOR shall, in the presence of the ENGINEER, test deflection of the pipe with a mandrel. The mandrel shall be hand pulled. All pipe with deflections in excess of five (5) percent of the base internal diameter, as determined by ASTM D 3034, ASTM F 679, or ASTM F 794 shall be excavated, re-rounded, backfilled and retested after an additional period of at least thirty (30) days. Mandrels shall have nine (9) ribs and be only hand pulled through the test section. The CONTRACTOR shall furnish the mandrels. The length of the minimum radius portion of the mandrel shall not be less than the one-third (1/3) of the nominal diameter of the pipe tested. The minimum mandrel diameter shall be no less than ninety (90) percent of the pipe inside diameter. The pipe shall be flushed and cleaned by the CONTRACTOR prior to testing. No flow will be permitted in the pipe while testing for deflections.

901.5.2.5 All expense for trenching, backfill, compaction, paving, and related work that is required because of failure to meet deflection test requirements shall be borne by the CONTRACTOR.

901.5.2.6 Acceptance of plastic pipe or fiberglass pipe sewers will be made only after these deflection test requirements have been met.

901.5.2.7 Minimum Diameters of Mandrels

<table>
<thead>
<tr>
<th>Nominal Pipe Size Diameter</th>
<th>Min. Mandrel Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>8 in.</td>
<td>7.2 in.</td>
</tr>
<tr>
<td>10 in.</td>
<td>9.0 in.</td>
</tr>
<tr>
<td>12 in.</td>
<td>10.8 in.</td>
</tr>
<tr>
<td>15 in.</td>
<td>13.5 in.</td>
</tr>
<tr>
<td>18 in.</td>
<td>16.2 in.</td>
</tr>
<tr>
<td>21 in.</td>
<td>18.9 in.</td>
</tr>
<tr>
<td>24 in.</td>
<td>21.6 in.</td>
</tr>
<tr>
<td>27 in.</td>
<td>24.3 in.</td>
</tr>
</tbody>
</table>

901.6 JOINTS FOR PIPE

901.6.1 (deleted section)

901.6.2 (deleted section)
SECTION 901
SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

901.6.3 JOINT FOR PLASTIC SEWER PIPE (PVC):

901.6.3.1 Refer to ASTM D 2321 and ASTM F 794 for pipe laying and joining of pipe guidelines.

901.6.3.2 Prior to the laying of pipe, each pipe component shall be inspected for damage and cleaned. Damaged components shall be rejected or repaired.

901.6.3.3 All joints will be assembled in accordance with manufacturer’s published recommendations. If a lubricant is required to facilitate assembly, it shall have no detrimental effect on the gasket or on the pipe when subjected to prolonged exposure. Proper jointing may be verified by rotation of the spigot by hand or with a strap wrench. If unusual joining resistance is encountered or if the insertion mark does not reach the flush position, disassemble the joint components and repeat the assembly steps. Note that fitting bells may permit less insertion depth than pipe bells. When mechanical equipment is used to assemble joints, care should be taken to prevent over-insertion.

901.6.4 JOINT FOR FIBERGLASS PIPE

901.6.4.1 All joints shall be as specified in Section 131 FIBERGLASS PIPE

901.7 TESTING FOR LEAKAGE

901.7.1 GENERAL:

901.7.1.1 Unless otherwise shown on the construction drawings or specifically deleted by the ENGINEER, in writing, all sanitary sewers shall be tested for leakage.

901.7.1.2 The CONTRACTOR may Air Test the sanitary sewer line before backfilling the trench to aid the CONTRACTOR in checking the installation for any defects. Such testing is at the option of the CONTRACTOR and shall not constitute an acceptance test under these specifications.

901.7.1.3 The test for acceptance and compliance with these specifications shall be performed after the pipe zone backfilling has been completed. In the case of new sanitary sewer lines with house laterals included as an integral part of the project, the test for acceptance and compliance with these specifications shall be performed after the house laterals or stubs have been completed and backfilled. The CONTRACTOR has the option to leave the end of the service line exposed.

901.7.1.4 If the leakage, as shown by the test, is greater than allowed by these specifications, the pipe shall be overhauled at the CONTRACTOR’s expense and, if necessary, re-laid until the pipe will satisfactorily pass the test.

901.7.1.5 The CONTRACTOR shall, at no additional expense to the OWNER, furnish all water, material, tools and labor for performing the required tests. All tests shall be made under observation of the ENGINEER.

901.7.2 INFILTRATION TEST:

901.7.2.1 An Infiltration Test shall be used only when excessive ground water prevents satisfactory testing by either the Exfiltration Test or the Air Test. In addition, the Infiltration Test must be performed after backfilling, before any service connections are functioning and at a time when the ground water is over the entire section of pipe and at or near its maximum level.

901.7.2.2 The procedure for conducting an Infiltration Test shall be as follows:

901.7.2.2.1 The pipe section shall be cleaned.

901.7.2.2.2 Determine the groundwater table. The groundwater table shall be determined for each section of sanitary sewer tested.

901.7.2.2.3 Plug the upstream pipe outlet from upstream manhole of the sections being tested with a plug which will assure a tight seal against flow from the upstream portion of the sewer system. Also plug all house laterals and any other connections to the section being tested.

901.7.2.2.4 Install a 90-degree V-notch weir in the downstream manhole of the section being tested. Weir must be installed plumb and sealed to the pipe wall surface.

901.7.2.2.5 A sufficient period of time must be allowed to permit the infiltrated waters to collect and flow over the weir. Water shall flow over the weir for at least 30-minutes prior to taking measurements.

901.7.2.2.6 The head (H) of water flowing over the weir must be measured accurately and the measurement taken at least 18-inches upstream from the crest of the weir.

901.7.2.2.7 Discharge over the 90-degree V-notch weir shall be calculated according to:

\[ Q = 3240 \times H^{2.5} \]

\[ Q = \text{Discharge in gallons per day} \]

\[ H = \text{Head in inches} \]

901.7.2.3 The allowable infiltration shall be 200-gallons per inch of pipe diameter per mile of pipe per day. When there is significantly more than two feet of groundwater above the top of the pipe at the highest point of the section being tested, ten percent additional infiltration above the permitted 200 gal/in.-dia/mi/day limit will be allowed for every 2-foot of additional head.

901.7.2.4 Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of
SECTION 901

SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

the work. The Water Authority assumes no liability for damages caused by plugs inadvertently left in the line by the Contractor. The CONTRACTOR shall certify in writing to the Water Authority the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal.

901.7.3 EXFILTRATION TEST

901.7.3.1 An Exfiltration Test may be conducted wherever the groundwater level is below the crown of the pipe at the highest elevation of the section of sanitary sewer being tested. If the groundwater level is above the crown of the pipe either the Air Test, properly adjusted, or Infiltration Test should be used.

901.7.3.2 The procedure for conducting an Exfiltration Test shall be as follows:

901.7.3.2.1 The pipe section shall be cleaned.

901.7.3.2.2 Plug the downstream pipe outlet to the manhole with a plug which will assure a tight seal against water leakage. Also plug all house laterals and any other connections to the section being tested.

901.7.3.2.3 If the upstream manhole is to be used as a reservoir for maintaining the pressure head on the sewer pipe, the inlet sewer pipe of pipes must be plugged. If a standpipe is to be used as a reservoir for maintaining the pressure head on the sewer pipe, the standpipe must be connected to the sewer pipe in the upstream manhole by a tightly sealed connection.

901.7.3.2.4 The amount of water (volume required to fill the section of sewer under test plus the manhole or standpipe) shall be calculated.

901.7.3.2.5 Water shall then be introduced through the manhole or standpipe. The amount of water introduced shall be metered. The amount of water introduced to fill the sewer should be approximately equal to the calculated amount. If the amount of water required to fill the sewer pipe is significantly greater than the calculated amount, it is an indication of a leak or leaks and consequent saturation of the backfill around the sewer pipe. Saturation of the backfill will invalidate the test.

901.7.3.2.6 The level of water in the manhole or standpipe shall be at least two feet above the crown of the pipe at the highest section of the section of sanitary sewer being tested.

901.7.3.2.7 After filling the pipe at least one hour shall be allowed for water absorption in the pipe. For some materials, up to six hours may be required. After the absorption period, the manhole or standpipe shall be refilled to the established measuring mark and the test begun.

901.7.3.2.8 If the upstream manhole is used as a reservoir for maintaining the pressure head on the sewer pipe, the difference in water surface elevation from original to final level in a two hour period shall be used to calculate the water lost. The water lost in the two hour period shall be converted into gallons per day. If a standpipe is used as a reservoir for maintaining the pressure head on the sewer pipe, the standpipe shall be refilled periodically during the two-hour test period to maintain an essentially constant head on the test section of pipe. The amount of water added shall be measured and shall be used to calculate the loss in gallons per day.

901.7.3.2.9 The allowable exfiltration shall be computed based upon the average pressure head above the crown of the pipe for the section tested as follows:

\[
\text{Allowable leakage} = \frac{\sqrt{h}}{\sqrt{3}} \times 200
\]

Allowable leakage in gallons per inch of pipe diameter per mile of pipe per day

\( h \) = average pressure head above the crown of the pipe, in feet (elevation of water at center run)

901.7.3.2.10 When the upstream manhole is used as a reservoir for maintaining the pressure head, the allowable leakage from the manhole shall be added to the allowable leakage calculated for the sewer pipe.

901.7.3.3 If the sanitary sewer line fails to pass the Exfiltration Test, a re-test shall be permitted only after the groundwater conditions surrounding the pipe return to a condition similar to those existent at the beginning of the test period. The groundwater elevation shall be determined prior to initiation of a second test.

901.7.3.4 Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of the work. The Water Authority assumes no liability for damages caused by plugs inadvertently left in the line by the Contractor. The CONTRACTOR shall certify in writing to the Water Authority the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal.

901.7.4 AIR TEST:

901.7.4.1 An Air Test may be conducted under all conditions of groundwater levels surrounding the sanitary sewer pipe. If the groundwater is above the crown of the pipe, the air pressure shall be increased by an increment equal to the pressure exerted by the groundwater over the pipe.

901.7.4.2 The procedure for conducting an Air Test shall be as follows:
901.7.4.2.1 Clean the pipe section (manhole to manhole reach of sewer) being tested by propelling a snug-fitting inflated ball, or other adequate method, through the pipe with water. It is important that the pipe is thoroughly wetted if consistent results are to be expected.

901.7.4.2.2 Plug all pipe outlets with pneumatic plugs. The pneumatic plugs shall be able to resist internal testing pressures without requiring external bracing. Give special attention to house laterals.

901.7.4.2.3 Determine the groundwater level surrounding the section of sewer under test. If the groundwater level is above the crown of the pipe, the test pressures shall be increased by 0.43 psig for each foot of water above the average elevation of the crown of the pipe. If the average vertical height of groundwater above the pipe invert is more than 12.7 feet, the section so submerged shall be tested using 9.0 psig as the starting test pressure. In no case should the starting test pressure exceed 9 psig.

901.7.4.2.4 Introduce air slowly to the section of pipe under evaluation until the internal air pressure is raised to 4.0 psig plus any increase required by a high groundwater level.

901.7.4.2.5 Allow the air pressure to stabilize. Air may be added slowly to maintain a pressure in the 3.5 to 4.0 psig (plus groundwater allowance) for two minutes.

901.7.4.2.6 After the stabilization period, when the pressure reaches exactly 3.5 psig (plus groundwater allowance) the stopwatch is started and when the pressure reaches exactly 2.5 psig (plus groundwater allowance) the stopwatch is stopped.

901.7.4.2.7 If the time required for a one pound pressure drop is not less than the allowable time for the pipe section under test to lose air, the section shall pass the leakage test.

901.7.4.2.8 If there has been no leakage (zero psi drop) after one hour of testing, the test section shall pass the leakage test.

901.7.4.3 In all cases where an Air Test is conducted, the manholes shall be tested separately as previously specified.

901.7.4.4 All persons conducting an Air Test must be aware that an Air Test may be dangerous if improperly conducted. It is extremely important and essential that all plugs be properly installed and braced by the CONTRACTOR in such a way that blowouts are prevented.

901.7.4.5 Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of the work. The Water Authority assumes no liability for damages caused by plugs inadvertently left in the line by the Contractor. The CONTRACTOR shall certify in writing to the Water Authority the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal.

901.7.5 AIR TESTING TABLE: Table 901.7.5.1 will be used to determine the required test duration for the section of line being tested.
### Table 901.7.5.1
Low-Pressure Air Test Time Specification for a Non-Pressure Sewer Line

#### Explanation and Use of Table

Explanation of Tables

<table>
<thead>
<tr>
<th>(A) Pipe Diameter (inches)</th>
<th>(B) Minimum Time (min:sec)</th>
<th>(C) Minimum Length for Minimum Time (feet)</th>
<th>(D) Time for Longer Length (seconds)</th>
<th>(E) Specification Time for Length (L) Shown (min:sec)</th>
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<tbody>
<tr>
<td>4</td>
<td>3:46</td>
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</tr>
</tbody>
</table>

#### Column A
Nominal diameter of pipe (any pipe material)

#### Column B
Minimum duration of air test up to a maximum of length of line being tested -
(e.g., 0-feet through 298-feet of 8-inch PVC:
Test Duration: 7 minutes 34 seconds)

#### Column C
Maximum length of line associated with minimum duration of time for the air test shown in Column B

(Revised August 2019) 901-8
SECTION 901
SANITARY SEWER COLLECTOR AND INTERCEPTOR FACILITIES

Column D

L = length of line in feet; product of computation yields duration (e.g., 250-feet of 12-inch PVC where ground water is not present)

Test Duration—3.418 * (250) = 854.5 sec. = 14 min. 15 sec.

Column E

Duration of air test for given incremental lengths of line.

901.8 CLEANING AND INSPECTION

901.8.1 CLEANING: No pipe spalls, rocks, dirt, joint compounds, cement mortar and other trash or obstructions shall be left in a sewer pipe of any size or type. During the flushing operations the manhole outlet shall be bagged or plugged so that debris will not be carried into or contaminate an existing or active line.

901.8.1.1 Under all circumstances, the CONTRACTOR shall be required to remove all plugs prior to acceptance of the work. The Water Authority assumes no liability for damages caused by plugs inadvertently left in the line by the Contractor. The CONTRACTOR shall certify in writing to the Water Authority the completion of the plug removal task. The certification shall include the locations of removed plugs and corresponding date of removal.

901.8.2 TELEVISION:

901.8.2.1 All completed sewer lines shall be inspected by a television camera before lines become operational or final acceptance of the installation.

901.8.2.2 After the CONTRACTOR has cleaned, flushed, and retrieved all debris and plugs in the line, the CONTRACTOR will notify the project engineer that the line is ready for television inspection. The CONTRACTOR in the presence of the ENGINEER or the engineer’s representative shall televise the line with televising equipment specifically designed and constructed for sewer line visual inspection.

901.8.2.2.1 The television camera shall be of color and equipped with a rotating lens capable of 360-degree rotation with zoom focus and a wide-angle optical lens permitting spontaneous focal adjustments, allowing viewing of service lateral connections, joints, pipe walls, etc.

901.8.2.2.2 A television report log, completed on the OWNER’S log form, shall be maintained during the television inspection. This log shall be completed to the OWNER’S satisfaction noting the location, project title, name of OWNER, date, type of pipe material, line size, location of services (live or stub-outs), manhole or station numbers, and any abnormal or line defects within the line segment.

901.8.2.2.3 The CONTRACTOR shall be responsible for subsequent televising when line repairs are required or when the previous televising is not satisfactory to the OWNER.

901.8.2.3 When the televising is complete, the CONTRACTOR shall turn over the complete television report logs and the recordings in a format acceptable to the Water Authority.

901.9 MEASUREMENT AND PAYMENT

901.9.1 SANITARY SEWER PIPE: Installed pipe shall be measured and paid for as follows:

901.9.1.1 For straight lines, the pipe length shall be the intervening distance between the centers of manholes along a line parallel to the pipe invert.

901.9.1.2 For curvilinear lines, the pipe length shall be the intervening distance between the centers of manholes along a line parallel to the pipe invert.

901.9.1.3 Payment for pipe will be in accordance with the unit price per linear foot per size and material as defined in the Bid Proposal, and shall include: pipe installed in the trench, jointing and coupling materials, and other materials necessary to connect to other sections of pipe, manholes, and other appurtenances.

901.9.2 CONNECTIONS: Connections, tying new sewer lines into existing manholes, shall be measured and paid for on a unit price per each within the size increments as specified in the Bid Proposal. Connections to the shelf section of the floor will not be considered for payment.

901.9.3 VERTICAL DROPS: Vertical drops at manholes shall be measured by the linear foot of pipe from the invert of the sewer line to be dropped to the spring line of the receiving main. Payment will be made on the unit price per linear foot per size and type of pipe as specified in the Bid Proposal.

901.9.4 TESTING:

901.9.4.1 Infiltration, exfiltration, and air tests of sewer mains shall include sewer service lines to the property lines, right-of-way lines, and easement lines as installed per the construction plans. No payment will be made for the initial test or subsequent tests.
901.9.4.2 Television inspection and documentation is considered incidental and shall be included in the construction item’s unit cost unless otherwise specified in the Bid Proposal.

901.9.4.3 There will be no payment for required testing of sanitary sewer manholes.

901.9.4.4 No payment will be made for deflection tests after the required waiting period for PVC sewer pipe installations.

901.9.5 REMOVAL AND DISPOSAL OF SANITARY SEWER PIPE: Removal and disposal of sanitary sewer lines shall be measured by the linear foot within the specified pipe size increments. Payment will be made on the unit price per linear foot of specified pipe size in the Bid Proposal. Trenching, backfilling, and pavement removal and replacement will be paid for based on the unit prices for each appropriate bid item in the Bid Proposal. If new pipe is to be installed in the same trench as the removed pipe, only one payment will be made for trenching backfilling, and pavement removal and replacement.

901.9.6 TRACE WIRE: Trace Wire: All work associated with the installation of the trace wire and system shall be considered incidental to the installation cost of the pipeline being traced.
<table>
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<tr>
<th>DWG. NO.</th>
<th>TITLE</th>
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<tbody>
<tr>
<td>2101</td>
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<td>2102</td>
<td>SANITARY SEWER MANHOLE TYPE &quot;E&quot;</td>
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<td>2103</td>
<td>SANITARY SEWER TYPICAL PLACEMENT OF MANHOLES AT ARTERIAL INTERSECTIONS</td>
</tr>
<tr>
<td>2107</td>
<td>SANITARY SEWER CONCRETE MANHOLE TOP SLAB TYPE &quot;C&quot;</td>
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<tr>
<td>2109</td>
<td>SANITARY SEWER MANHOLE FRAMES AND COVERS</td>
</tr>
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<td>2110</td>
<td>SANITARY SEWER MANHOLE LIFT STATION AND VALVE VAULT</td>
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<td>2111</td>
<td>SANITARY SEWER MANHOLE LIFT STATION DETAILS</td>
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<td>SANITARY SEWER SERVICE REPLACEMENT DETAIL</td>
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<td>SANITARY SEWER SAMPLING AND METERING MANHOLE 6' x 8' RECTANGULAR</td>
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<td>VACUUM SEWER STANDARD DETAILS</td>
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<td>2163</td>
<td>VACUUM SEWER VALVE AND PIT INSTALLATION WITH LIFT IN VACUUM SERVICE LATERAL</td>
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<td>VACUUM SEWER TYPICAL VACUUM BRANCH LINE CONNECTION</td>
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<td>VACUUM SEWER 3&quot; VALVE AND PIT INSTALLATION WITH INTERNAL BREATHER</td>
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<td>VACUUM SEWER SINGLE BUFFER TANK 30 GAL PER MINUTE MAX. FLOW</td>
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<td>VACUUM SEWER DUAL BUFFER TANK 60 GAL PER MINUTE MAX. FLOW</td>
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<td>VACUUM SEWER SERVICE WYE ON EXISTING VACUUM MAIN</td>
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<td>VACUUM SEWER CASING DETAIL FOR BORE AND JACK</td>
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<td>FORCEMAIN SEWER CONNECTION TO GRAVITY SEWER AT MANHOLE</td>
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<td>FORCEMAIN SEWER TYPICAL FORCEMAIN CONFIGURATION</td>
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<td>SEWER MANHOLE TRACER WIRE DETAILS</td>
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GENERAL NOTES
1. THIS DETAIL REFERS TO NEW INFRASTRUCTURE AND IS NOT TO BE USED AS A RELOCATION PLAN FOR EXISTING INFRASTRUCTURE. FURTHER DETAILS AND LAYOUT OF MANHOLE LOCATIONS SHALL BE APPROVED BY THE WATER AUTHORITY TO CONFORM WITH SPECIFIC SYSTEM AND SITE REQUIREMENTS. ENGINEER SHALL COORDINATE DESIGN WITH THE INTERSECTION AND ALL RELATED SYSTEMS. DESIGN MUST BE APPROVED BY THE WATER AUTHORITY AND ALL PARTIES INVOLVED WITH THE INTERSECTION PRIOR TO CONSTRUCTION.

2. SEE STANDARD DRAWINGS SECTION 2400 FOR PAVING, AND SECTION 2500 FOR TRAFFIC/INTERSECTION DETAILS.

3. GREEN BACKGROUND LAYOUT REPRESENTS GUTTED FLOW LINES. DEPENDING ON THE INTERSECTION, THIS DESIGN WILL VARY.

4. PAVEMENT STRIPING SHOWN IS DIAGRAMMATIC ONLY.

CONSTRUCTION NOTES
A. MANHOLE PER STANDARD DRAWINGS 2101 OR 2102.
GENERAL NOTES
1. ALL MANHOLE 2300 IN DIAMETER WILL REQUIRE AN INTERMEDIATE LANDING IN THE MANHOLE (FROM TYPE "C"
MANHOLE TOP SLABS SHALL BE USED AS INTERMEDIATE LANDING).
2. INTERMEDIATE LANDINGS SHALL BE LOCATED AT THE MID
POINT 72" OF THE DIAMETER OF THE MANHOLE AT 4" THE
SMALL INTERMEDIATE LANDING ON A 4" ADJUSTMENT
TOP SLAB INSTALLED UP TO 8" UP FROM THE POINT
OF THE MANHOLE.

CONSTRUCTION NOTES
A. PRECAST REINFORCED CONCRETE MANHOLE TOP SLAB.
B. ALL BARS TO HAVE 1 1/2" MIN. COVER.
C. 1" PIPE SLEEVE VERTICALLY THROUGH TOP SLAB.
D. TOP WAT NO. 4 BARS 6" OD. EACH WAY FOR 4", 6" AND 8"
MANHOLE.
E. NO. 4 BARS
F. BOTTOM WAT NO. 4 BARS 6" OD. EACH WAY FOR 4" AND 6" 
MANHOLE, NO. 8 BARS 6" OD. EACH WAY FOR 8" TOP
MANHOLE.
G. NO. 4 BARS FOR 4" AND 6" TOP MANHOLE.
H. WHEN PRECAST MANHOLE SECTIONS CUT ARE USED, TOP SLAB
SHALL BE WELDED TO SHOE OR APPEARANCE AS A TONGUE AND 
GROOVE JOINT.
J. CONCRETE, SEE SECTION 101.

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<th>MANHOLE I.D.</th>
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NOTES:
1) Fc = 4000 psi (MN)
2) fy = 60,000 (MN)
3) 1 1/2" MINIMUM CLEAR CONCRETE COVER OVER REINFORCEMENT
4) HS-20 LNE LOAD
5) SEE TABLE FOR APPROPRIATE WEIGHT

SANITARY SEWER
CONCRETE MANHOLE TOP SLAB TYPE "C"

REVISIONS
WATER AUTHORITY
Dwg. 2107
JAN. 2013
GENERAL NOTES

1. WAREHOUSE LOCATION, FINAL DESIGN AND LAYOUT SHALL BE APPROVED BY THE WATER AUTHORITY TO CONFORM WITH SPECIFIC SYSTEM AND SITE REQUIREMENTS. ENGINEER SHALL SUBMIT A PROJECT SPECIFIC DETAIL, SUBMIT SHOP DRAWINGS OF VALVE OR WAREHOUSE AND MAIN SIZING, PRIOR TO FABRICATION AND PIPE INSTALLATION. IF LOCATED IN ROADWAY, COORDINATE THE PROPOSED WAREHOUSE LOCATION WITH ANY FUTURE ROADWAY IMPROVEMENTS.

2. MINIMUM WAREHOUSE INNER DIAMETER = 48 IN

3. WAREHOUSE MAY BE CONSTRUCTED OF CONCRETE BLOCK, POURED CONCRETE, OR PRECAST CONCRETE. IF PRECAST CONCRETE IS USED, USE MASON GASKETS AND APPLY NON-SLIPPING GRIP TO EXTERIOR AND INTERIOR OF EXPANSION JOINTS. IF BLOCK IS USED, APPLY 1/2" THICK MORTAR COATING TO EXTERIOR AND INTERIOR OF WAREHOUSE.

4. ALL PARTS WITHIN THE WAREHOUSE MUST CONFORM TO THE CURRENT WATER AUTHORITY APPROVED PRODUCTS LIST.

CONSTRUCTION NOTES

A. VERTICAL DROP
B. FORM PIPE INSERT IN SLEEV
C. SLOPE, 1' PER FT.
D. WAREHOUSE TYPE FOR UPPER PORTION WILL BE SPECIFIED ON DESIGN PROFILE.
E. USE DUCTILE IRON OR PVC (SDR 35) PIPE THROUGHOUT DROP.
F. USE ELBOW AND SLOPE 45° SHORT OR LONG RADIUS BEND.
G. CONCRETE SUPPORT WITH EAGLE PIPE O.D. PLUS 6" MIN. EACH SIDE.
H. CONCRETE, SEE SECTION 101.
I. PRECAST CONCRETE BASE, SEE CONSTRUCTION NOTE F. ON DRAWINGS 2101 A 2100.
J. FOR NEW DROP ON EXISTING WAREHOUSE, CONSTRUCT 3' X 3' CONCRETE BASE BEFORE CONSTRUCTING DROP SUPPORT.
K. 4" ABOVE SPRING LINE OR AS SHOWN ON PLAN.
L. 6" MIN. DIAMETER, 2" 2 1/2" OR 1" 45° ELBOW.
M. INTERIOR OF DROP WAREHOUSE MUST BE COATED WITH APPROVED SEALER IN ACCORDANCE WITH SPEC. SECTION 301.4.
N. CORE DRILL FOR ALL WALL PENETRATIONS ON EXISTING WAREHOUSES.
O. TEE
GENERAL NOTES – RING
1. ALBUQUERQUE VALVE BOX RING DESIGNED TO ACCEPT AN ALBUQUERQUE VALVE BOX COVER.
2. THE CASTING NUMBER, MANUFACTURER’S LOGO, DATE OF MANUFACTURE AND USA* SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4" UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH REMOVE EXCESS IRON AND PIN.
6. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

GENERAL NOTES – COVER
1. ALBUQUERQUE VALVE BOX COVER DESIGNED TO FIT INTO AN ALBUQUERQUE VALVE BOX RING.
2. THE CASTING NUMBER, MANUFACTURER’S LOGO, DATE OF MANUFACTURE AND USA* SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4" UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 3-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH REMOVE EXCESS IRON AND PIN.
6. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

REVISIONS
WATER AUTHORITY
SANITARY SEWER RING AND COVER FOR VALVE BOX
Dwg. 2126
Jan. 2013
GENERAL NOTES
1. IF DISTANCE L IS 5' OR LESS, ROUTE MAIN SERVICE TEE AND RECONNECT SERVICE AS PER DETAIL I. IF DISTANCE L IS GREATER THAN 5', INSTALL PIPE AS PER DETAIL II.

2. WHERE DEPTH IS INSUFFICIENT TO ALLOW RECONNECTION AS SHOWN IN DETAIL I OR II, RECONNECT SERVICE AS DIRECTED BY ENGINEER.

3. THE SANITARY SEWER SERVICE LATERAL IS CONSIDERED PRIVATE FROM THE MAIN LINE, INCLUDING THE SERVICE TEE TO THE PROPERTY LINE AND BEYOND. ALL MAINTENANCE AND/OR REPLACEMENT IS THE RESPONSIBILITY OF THE PROPERTY OWNER FOR WHICH IT IS PROVIDING THE SERVICE.

CONSTRUCTION NOTES
A. VARIABLE WITH A MAX. OF 5'.
B. 1" W.RV., 1-1/2" MAX.
C. ELEOBS, 45° DEFLECTION WAX.
D. INSTALL CONCRETE CRADLE ON TEE AS PER DWG. 2135, ALSO PIPE ONLY.
E. SERVICE TEE
F. SERVICE LINE
G. VARIABLE LENGTH
H. BACKFILL UNDER SERVICE WITH MIN. 1 CUBIC FOOT OF CONCRETE.
J. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.
K. RIGHT-OF-WAY LINE
L. DEPTH PLACEMENT PER MANUFACTURER'S RECOMMENDATIONS.
M. STRAP OR CHEEK PIPE DIAMETER AND 5" ON TOP OF CURB OVER LOCATION OF SERVICE LINE. MINIMUM 1/4" DEEP.
N. CURB & GUTTER.
GENERAL NOTES:

1. RISERS WILL BE USED WHERE SEWER IS OVER 14 FT. IN DEPTH OR WHERE WATER TABLE IS ABOVE SEWER LINE. TOP OF RISER SHALL BE 10 FT. BELOW THE PAVEMENT OR GROUND SURFACE WHEN SEWER MAINS ARE INSTALLED DEEPER THAN 14 FT. OR SHALL BE 2 FT. ABOVE WATER TABLE.

2. BRACE RISER PIPE SECURELY BEFORE BACKFILLING. LAY EACH JOINT OF RISER PIPE AS BACKFILLING PROGRESSES. CAREFULLY TAMPER BACKFILL AROUND EACH JOINT OF RISER PIPE. EXTREME CARE MUST BE TAKEN IN ORDER TO PREVENT SHOVING OF PIPE OUT OF PLUMB.

3. ELECTRONIC MARKER DISK SHALL BE PROVIDED OVER RISER AT A DEPTH OF APPROX. 4 FT. TO LOCATE PIPE.

CONSTRUCTION NOTES:

A. TAPPING TEE, FOR CONNECTION TO EXIST. LINES WHERE NO EXIST. TEE IS AVAILABLE OR STD. PIPE TEE FOR NEW CONSTRUCTION. SEE NOTE K, DWG. 2125.

B. PROVIDE CONC. OR CLAY PLUG.

C. 4" OR 6" RISER, (C.I.P.)

D. WATER TIGHT GASKET PRESSURE RING JOINT.

E. CONC. CRADLE & SUPPORT.

F. CORE DRILLED TAP.
GENERAL NOTES

1. THESE DETAILS REFER ONLY TO INSTALLATIONS ON FLEXIBLE PIPE MAINS. REFER TO OTHER APPROPRIATE STANDARDS FOR RIGID PIPE MAINS.

2. DETAIL "A" SHALL BE USED WHEN A TRENCH BOX, SHOING OR OTHER MEANS OF EXCAVATION BRACING IS USED, OTHERWISE IT SHALL BE THE CONTRACTOR'S OPTION TO USE EITHER DETAIL "A" OR DETAIL "B".

3. REFER TO SPECIFICATION SECTION 905 FOR MATERIAL REQUIREMENTS.

4. TRENCH SLOPES SHALL BE AS PER THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS.

DETAIL "A"

- 45° BENDS
- UNCOMPACTED FILL
- 6" CASING (COMP OR PVC SDR-35)
- COMPACTED BACKFILL
- 4" SERVICE LINE
- CONSOLIDATED PIPE EMBEDMENT MATERIAL
- TAPPING SADDLE

DETAIL "B"

- 45° BEND
- COMPACTED BACKFILL
- 4" SERVICE LINE
- 22½° BEND
- TAPPING SADDLE
- MIN. 1 CUBIC FOOT PC CONC UNDER SERVICE
- CONSOLIDATED PIPE EMBEDMENT MATERIAL

WATER AUTHORITY

SEWER
RISER DETAILS
FLEXIBLE PIPE MAIN
DWG. 2136
AUG. 1996

REVISIONS
11-14-91
GENERAL NOTES:

1. Where a water line passes beneath or less than 18 in. above an exist. sewer line, the sewer line shall be encased in con. 6" thick as detailed, for at least 10 ft. on each side of the water line, or the sewer line shall be D.I. or C-900 PVC pipe with pressure-type joints for at least 10 ft. on each side of the water line. This shall also apply where a parallel water line is less than 10 ft. horizontally and less than 2 ft. above the sewer line.

CONSTRUCTION NOTES:

A. Sanitary sewer line as shown on plans.
B. 4-#4 bars, cont. with 3" clearance.
C. #4 bars, at 36" O.C.

SECTION A-A
GENERAL NOTES
1. Depth to backfilling, invert elevation and location will be measured. This information will be recorded on as-built drawings.

CONSTRUCTION NOTES
A. EXISTING GROUND
B. NEW PAVING
C. SEWER LINE
D. PLUG
E. ELECTRONIC MINDER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170 FOR PLACEMENT DETAILS.
F. WARNING TAPE TO BE INSTALLED ON ALL SANITARY SEWER LINES.

ELEVATION
**GENERAL NOTES**

1. **This design is applicable for manholes 2.5’ in depth measured from floor to concrete curb.** Depths > 3.5’ will require design by a registered engineer in your jurisdiction.

2. **Industrial manholes shall be located on private property outside of city right-of-way. The water authority shall have access to the manhole at all times of the day or night.**

3. **All installations will require the use of aluminum platforms, sampling and flow metering apparatus to be provided by the industrial user. Final decision relative to the requirement for monitoring equipment and the specific type of flume will be made by the water authority for each individual case.**

4. **A parshall flume or Palmer Roulxus flume shall be furnished and installed in accordance with this detail.** The flume must be sized to accurately measure all anticipated flow levels prior to installation. The flume size and type must be approved by the water authority.

5. **In order to control velocities at a level that allows for accurate flow measurement, slopes on the inlet sewer lines for 20’ outside the manhole must be as specified in Table 1 for the various size lines. Outlet sewer lines must be designed to carry the maximum design flow without creating a surcharged condition in the flume.**

**CONSTRUCTION NOTES**

A. **All manhole bases, reeds, sections and flat slab top sections shall be prestressed reinforced concrete.**

B. **3”-2” SD, Aluminum floor door with recessed mesh covered by a hinged up (up) flush with top surface. Hardware and hinges shall be 316 Stainless Steel, Bolt Type 4 or equal. HS-10 live load rated where applicable.**

C. **Ladder per standard drawings 2335.**

D. **Concrete pipe supports shall extend outside the manhole to a point of first joint and shall provide pipe to the spring line.**

E. **Prefabricated monitoring flume to be installed in accordance with manufacturer’s recommendations. A parshall flume on a Palmer Roulxus flume shall be installed as directed by the water authority.**

F. **Concrete fillers, fillers to match top of flume and slope one inch per foot.**

G. **Manhole pipe connections to be per ASTM C-923, standard spec for resilient connectors between reinforced concrete manhole structures and pipes.**

H. **6” grout filler on upper half of pipe and around base.**

J. **Backfill per section 101.**

K. **2” gravel crushed stone leveling course.**

L. **Flume outlet end adapter.**

M. **Slope per Table 1.**

---

**TABLE 1**

<table>
<thead>
<tr>
<th>PIPE SIZE (IN)</th>
<th>REQUIRED INLET SLOPE (FT/FT)</th>
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<tbody>
<tr>
<td>4</td>
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**WATER AUTHORITY**

**SANITARY SEWER SAMPLING AND METERING**

**MANHOLE 6’x8’ RECTANGULAR**

**DWG. 2150**

**JAN. 2013**

**REVISIONS**
GENERAL NOTES

1. ALL CONTRACTOR FOR INSTALLATION OF ANY MANHOLE TO BE 95% OF MAXIMUM DRY DENSITY PER ASTM D 1557.

2. INTERIOR OF MANHOLE SHALL BE COATED IN ACCORDANCE WITH SECTION 620.4.0.2 OF THE SPECIFICATIONS.

CONSTRUCTION NOTES

A. SEE CONSTRUCTION PLANS FOR DEPTH REQUIRED.

B. 2" TAPPING SADDLE

C. SEALAGE AIR RELEASE VALVE PER APPROVED PRODUCTS LIST AND CONSTRUCTION PLANS AND SPECIFICATIONS.

D. CAST IRON MANHOLE FRAME AND COVER. SEE STANDARD DRAWING 2109.

E. CONCRETE COLLAR PER STANDARD DRAWINGS 2101 AND 2661.

F. PRECAST CONCRETE TOP SLAB FOR MANHOLE WITH 2'-0" GALL OPENING PER STANDARD DRAWING 2107.

G. FORCE MAIN

H. 12" DEEP 3/4" GRAVEL, ASTM C33, NO. 57 GRAVEL

J. COMPACTED SUBGRADE DESIGNATED TO 12" BELOW FOUNDATION.

K. USE 4'-0" ID, CONCRETE MANHOLE SECTIONS (PER SECTION 1012), C60 CONCRETE (F=4000 psi AT 28 DAYS). ADDITIONAL SECTIONS MAY BE ADDED.

L. FINISH GRADE IN PAVED AREAS

M. SLOTTED OPENING 1" LARGER THAN FORCE MAIN WITH APPROVED GASKET, GROUT INTERIOR AND EXTERIOR OF OPENING.

N. LOCATION OF LD

P. 2-CONCRETE ANTI-FLOWITION COLLAR VALVES. SEE STANDARD DRAWING 2171. OR CAST-IN-PLACE CONCRETE OF SIMILAR DESIGN.

Q. FINISH GRADE IN UNPAVED AREAS

R. ELECTRONIC MARKER DEVICES (EMD). SEE STANDARD SPECIFICATION SECTION 170.
GENERAL NOTES
1. Gravity lines in all installations, service shall flow by gravity to the holding tank.
2. Install gravity lines in accordance with water authority standards and local codes.
3. Private gravity service line must include a vent at a minimum of 20° and a maximum of 60° from the vacuum value collection pipe. Vent piping shall be the same diameter as the private gravity service line.

CONSTRUCTION NOTES
A. 45° elbow
B. Pipe in vertical position
C. Vacuum sewer main
D. Concrete collar per standard drawing 2461.

VEHICLE DETAIL

VACUUM SEWER VALVE AND PIT INSTALLATION WITH LIFT IN VACUUM SERVICE LATERAL

Dwg. 2163
Jan. 2015
GENERAL NOTES
1. UNLESS SHOWN ON CONSTRUCTION DRAWINGS, DIVISION VALVES WILL NOT BE INSTALLED FOR SERVICE CONNECTIONS.

CONSTRUCTION NOTES
A. 45° ELBOW
B. DIVISION VALVE AS SHOWN ON CONSTRUCTION DRAWINGS
C. REDUCTION WYE AT 45°
D. 22 1/2° ELBOW
E. MAIN LINE WYE AT 45°
F. BOTTOM OF BRANCH IS AT TOP OF MAIN
G. BOTTOM OF BRANCH IS 1" TO 2" ABOVE TOP OF MAIN
H. VACUUM MAIN
J. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
GENERAL NOTES

1. THE FOLLOWING HOLES IN VALVE PIT AND SUMP TO BE FIELD CUT: 5" GRAVITY (SUMP)

2. ONLY HOMES OR APARTMENTS WHOSE LOWER FLOOR ELEVATIONS ARE THE SAME SHOULD BE CONNECTED TO A COMMON VACUUM VALVE PIT INSTALLATION. WITH MULTIPLE FLOOR APARTMENTS, EACH FLOOR SHOULD BE SERVICED BY ITS OWN VACUUM VALVE PIT PACKAGE.

3. FOR ANTI-FLOATATION RING, GRADE-LEVEL PAD, PIPING FROM VALUE PIT TO VACUUM MAIN AND GRAVITY SERVICE STUBS, VALVE TO BE INSTALLED BY OWNER, ALL OTHER INSTALLATION AND TESTING BY CONTRACTOR.

CONSTRUCTION NOTES

A. FIT MOLDED FIBERGLASS VALVE PIT BOTTOM WITH HOLES FACTORY CUT.

B. GLUE HALF OF A SLIP COUPLING IN PLACE AT 4" TO 6" FROM END OF GRAVITY LINE TO ACT AS A STOP.

C. ANTI-FLOATATION RING (TP), SEE STANDARD DRAWING 2171.

D. JACKET SEALING WITH NEO-PRENE RUBBER G-RING, HOLDING TANK BOLTED TO VALVE PIT BOTTOM WITH 6 S.S. NUTS, BOLTS AND WASHERS.

E. OFFSET 45° TO AVOID CONFLICT BETWEEN PIPES.

F. CAST IRON MANHOLE FRAME AND COVER RATED FOR 2000 LBS.

G. SPIRAL WOUND, 2000 LBS. I.D. AT TOP, 1500 LBS. I.D. AT BOTTOM.

H. 4" CLEANOUT/SENSOR ASSEMBLY.

J. 2" SENSOR LINE.

K. 3" SUCTION LINE.

L. FIBERGLASS SUMP 30" DEEP, SUMP 30" I.D. AT TOP, 15" I.D. AT BOTTOM.

M. FIBERGLASS SUMP 5" DEEP TO ALLOW CONNECTION OF DEEP GRAVITY LINE, DIAMETERS SAME AS 30" SUMP.

N. SUMP BREATHER ASSEMBLY.

O. 2" APRIC PVC SENSOR CAP.

Q. 3" NO-HUB COUPLINGS.

R. 2x4 REDUCER COUPLING W/HUB REMOVED. (GLUE JOINTS)

S. 4" PVC GRAVITY STEEL EXTEND TO PROPERTY LINE UNLESS OTHERWISE DIRECTED AND GLUE CAP.

T. END BEVELED.

U. CONCRETE COLLAR PER STANDARD DRAWING 2461.

V. GROOVE.

W. 26" LONG, 30" DEEP MOLDED TANK OR 49" LONG, WITH 54" DEEP MOLDED TANK FULLY INSIDE THROUGH PIT BOTTOM TO STOP.
VENT INLET DETAIL

PLAN

SECTION A-A

SECTION B-B

GENERAL NOTES
1. Any lift exceeding 5' must be added to head losses on vacuum main and service line to determine if sufficient vacuum head is available.
2. All materials and hardware for installing valve to be furnished by contractor. All installation and testing by contractor. Except valve, to be installed by owner. All PVC fittings to be glued except where noted. Grill hole in wall for mounting screw for sump breather.

CONSTRUCTION NOTES
A. Sump breather assembly
B. Concrete collar, see standard drawing 2101.
C. Concrete manhole section
D. 3" vacuum service line
E. Gravity inlet must be located between the vacuum service line and the start of slope to sump. Min. 4' gravity sewer with matching diameter vent. Min. 20', max. 60' from vacuum buffer tank.
F. Standard flexible connections. All connections to buffer tank must be water tight.
G. 1" ft long, 18" id. PVC pipe may be used to form sump area.
H. Make concrete
J. Sewer frame & cover per standard drawing 2109.
K. Precast concrete flat top for manhole with 2-1/2" dia. opening.
L. 3" model "T" valve by Arvin or equal.
M. 2" PVC sensor cap supplied with valve.
N. 2" PVC sensor pipe.
P. Precast concrete bottom in manhole section.
Q. 3" street ell touching base of sump with plain end. No connection.
R. Valve and piping removed for clarity.
S. Sensor pipe.
T. Valve connection
U. Location of lid
V. Vent fabricated with 90° ells. Height must be above flood water level. 8" below finished floor level of lowest residence served.
W. Use 4-1/2" id. concrete manhole sections. Additional sections may be added to allow connection of deep gravity lines or for added storage capacity.

WATER AUTHORITY
VACUUM SEWER
SINGLE BUFFER TANK
30 GAL/MINUTE MAX. FLOW
DWG. 2167 JAN. 2013
GENERAL NOTES
1. ANY LOSS EXCEEDING 1 FT MUST BE ADDED TO HEAD LOSSES ON VACUUM MAIN AND SERVICE LINE TO DETERMINE IF SUFFICIENT VACUUM HEAD IS AVAILABLE.

2. ALL MATERIALS AND HARDWARE FOR INSTALLING VALVE TO BE PURCHASED BY CONTRACTOR. ALL INSTALLATION AND TESTING BY CONTRACTOR. EXCEPT VALVE TO BE INSTALLED BY OWNER. ALL PVC FITTINGS TO BE GLUED EXCEPT WHERE NOTED. CHILL HOLE IN WALL FOR MOUNTING SCREW FOR SUMP BREATHER.

CONSTRUCTION NOTES
A. SUMP BREATHER ASSEMBLY (ONE PER VALVE).
B. 1 FT LONG, 18" I.D. PVC PIPE MAY BE USED TO FORM SUMP AREAS.
C. MASON CONCRETE CENTER DRAIN WALL.
D. SEWER MANHOLE FRAME & COVER PER STANDARD DRAWING 2108.
E. CONCRETE COLLAR PER STANDARD DRAWING 2461.
F. PRECAST CONCRETE FLAT TOP FOR MANHOLE WITH 2'-6" ERA OPENING.
G. 2" PVC SENSOR CAP SUPPLIED WITH VALVE.
H. 2" PVC SENSOR PIPE.
I. PRECAST CONCRETE BOTTOM IN MANHOLE SECTION.
J. 3" STREET ELL TOUCHING BASE OF SUMP WITH PLAIN END. NO CONNECTION.
K. VALUE AND PAVING REMOVED (REMOVED FOR CLarity)
L. 18" DIAMETER SUMP (2)
M. LOCATION OF LD
N. USE 4'-5" ID. CONCRETE MANHOLE SECTIONS. ADDITIONAL SECTIONS MAY BE ADDED TO ALLOW CONNECTION OF DEEP GRAYLINE LINES OR FOR ADEQUATE STORAGE CAPACITY.
O. 3" VACUUM SERVICE LINES MUST ENTRANCE CONNECT DIRECTLY TO A 6" MINIMUM DIAMETER MAN-HOLE SERVICE LINE FITTED WITH STANDARD FLEXIBLE CONNECTIONS AT THE HOLES IN THE MANHOLE SECTION TO ENSURE THAT THE BUFFER TANK IS WATER TIGHT.

P. MINIMUM 6" GRAYLINE LINES WITH INLET DIAMETER VENT. MIN. 20X MAX. 50 FT BUFFER TANK. CONNECT 6" LINE TO 12" X 6" REDUCER. CONNECT REDUCER TO 12" PIPE ENTERING MANHOLE. CENTER 12" PIPE OVER CENTER GRAYWALL. "C" 12" LINE SHALT BE FITTED WITH STANDARD FLEXIBLE CONNECTIONS AT THE HOLES TO ENSURE THAT BUFFER TANK IS WATER TIGHT.
Q. SHAPE SLOPED CONCRETE TO DISTRIBUTE FLOW EVENLY BETWEEN SUMPS.
R. GRAYLINE INLET MUST BE LOCATED BETWEEN THE VACUUM SERVICE LINE AND THE START OF SLOPE TO SUMP.
U. 3" MODEL "T" VALVE. BY ARRANGEMENT OR EQUAL, TO BE INSTALLED BY OWNER.
GENERAL NOTES
1. THESE NUTS AND SOCKETS ARE A PART OF THE VALVE STEM EXTENSION. SEE VACUUM SEWER VALVE BOX DWG. 2170.

CONSTRUCTION NOTES
A. 2" LONG H.R. STEEL BAR, 2" x 2".
B. 2" E.A.L. STEEL CIRCLE WITH PENTAGON CIRCUMSCRIPTED ABOUT CIRCLE.
C. 1" O.D. SCHEDULE 40 PIPE x 2" 1.315 O.D. x 1.049 I.D.
D. DRILL 0.313 DIAMETER HOLE THROUGH PIPE FOR 0.31 DIAMETER CLEVIS PIN/GUTTER PIN.
E. 3 1/4".
F. 1" DIAMETER EXTENSION BAR, 6 FEET LONG, WITH T HANDLE.
G. 1" DIAMETER, SCH 40 x 2" 1.315 O.D. x 1.049 I.D.
H. PENTAGONAL SHAPE x 1/4" H.R. STEEL PLATE 1/2" LARGER THAN TUBULAR SECTION BELOW.
J. 2" LONG H.R. STEEL PENTAGONAL SHAPE TUBULAR SECTION x 0.1875 WALL WITH 1/8" TOTAL CLEARANCE TO EXTENSION NUT.
GENERAL NOTE

1. LATERAL REQUIREMENTS BEFORE THE WORK WILL BE ACCEPTED, SEWER VALVE GPS COORDINATES SHALL BE PROVIDED ON THE RECORD DRAWINGS. GPS COORDINATES OBTAINED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF NEW MEXICO SHALL BE TAKEN AT THE VALUE OPERATING HOLE ON THE NGO 1914 NEW MEXICO STATE PLANE CENTRAL ZONE FOR X AND Y COORDINATES AND NAD 83 FOR Z COORDINATE.

CONSTRUCTION NOTES

A. COMPACTED SUBGRADE (SIEVE COMPACTION) SEE SECTION 701. OVERGRAVITY TO 1/2" BELOW FOUNDATION.

B. 8" x 18" CONCRETE FOUNDATION WITH 2-#6 BARS SPACED 3" FROM SIDES AND BOTTOM.

C. 4 FT Lid. PRECAST CONCRETE MANHOLE SECTIONS.

D. 6" DEEP, 3/4" GRAVEL.

E. SLOTTED OPENING 1" LARGER THAN VACUUM MAIN WITH APPROVED WATERSTOP, GROUT INTERIOR AND EXTERIOR OF OPENING.

F. VACUUM MAIN LINE

G. RESILIENT COATED METAL GATE VALVE PER APPROVED PRODUCTS LIST. PROVIDE 3" x 6" SLIDING NUT PER STANDARD DRAWING 2169.

H. WEDGE, OR EQUAL, RETAINING CLAMP

I. PRECAST REINFORCED CONCRETE TOP SLAB WITH 24" DI. OPENING PER STANDARD DRAWING 2107.

J. OCTAGONAL CONCRETE COLLAR PER STANDARD DRAWING 2461. INSPECT CONCRETE SURFACE WITH SIZE OF VACUUM LINE AND CENTERING OF FLOW PER STANDARD DRAWING 2181. IN PAVED AREAS, INSTALL COLLAR FLUSH WITH PAVEMENT. IN UNPaved AREAS, SET RING 1" ABOVE GRADE AND SLIPE TOP OF CONCRETE DOWN TO 1" BELOW GRADE.

K. #4 REBAR PER STANDARD DRAWING 2451.

L. 24" MANHOLE FRAME AND COVER PER STANDARD DRAWING 2109.

M. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170.
GENERAL NOTES
1. ALL CONCRETE OF SUBGRADE AND AND FACULTY FOR INSTALLATION OF VACUUM VALVE PIT TO BE 90% OF MAXIMUM DRY DENSITY PER ASTM C 1507.
2. AVOID EXCESSIVE EXPOSURE TO SUNSHINE OF OPEN VACUUM VALUE PITS. CLOSE & COMPLETE WITHIN 3 DAYS TO INSURE INTEGRITY OF RUBBER O-RING.
3. SEE STANDARD DRAWING 2165 FOR ADDITIONAL DETAILS.

CONSTRUCTION NOTES
A. 65" SQUARE CONCRETE ANTI-FLOATION COLLAR, WITH #4 REBAR AT 6" C.C. 3" FROM EDGE OF CONCRETE. SEE TABLE 1. TOLERANCE SHEET FOR THICKNESS. CONCRETE PER SECTION 101, HYDRAULIC STRUCTURAL CONCRETE, F = 4000 psi AT 28 DAYS.
B. CLEARANCE BETWEEN CONCRETE COLLAR AND FIBERGLASS PIT.
C. 35° DIA. OPENING AT TOP OF SLAB.
D. 35 1/2° DIA. OPENING AT BOTTOM OF SLAB.
E. INSTALL CONCRETE COLLAR PER STANDARD DRAWING 2461.
F. CAST IRON MANHOLE FRAME AND COVER RATED FOR 1020 LOADING.
G. 1" CLEARANCE TO BOTTOM OF 3" LATERAL.
H. 3" THICK 3/4" GRAVEL, ASTM C 33, NO. 57 GRAVEL.
J. COMPACTED SUBGRADE.
K. FINISH PAVING SURFACE.

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<tr>
<td>DESCRIPTION</td>
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<td>30&quot; SUMP PACKAGE</td>
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<td>54&quot; SUMP PACKAGE</td>
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(SEE STANDARD DRAWING 2165)
GENERAL NOTES
1. BENTONITE COLLAR TO BE INSTALLED EVERY 25' ALONG VACUUM SEWER RUN AND FORCE MAIN.
2. BENTONITE SEEPAGE COLLARS ARE FOR VACUUM SEWER MAINS AND FORCE MAINS INSTALLED IN WERCE RIZATION RIGHT-OF-WAY OR AS SHOWN ON CONSTRUCTION DRAWINGS.
3. COST OF COLLARS IS INCIDENTAL TO PIPE CONSTRUCTION.

CONSTRUCTION NOTES
A. 4", 6", 8", OR 12" VACUUM SEWER
B. DEPTH PER PLANS
C. FINISH GRADE
D. 80 LB BAG OF RED-MIX CONCRETE WITH CUT ON TOP.
E. BENTONITE SEEPAGE COLLAR, SEE SPEC. BELOW
F. MIN. DISTANCE FROM 4" BENDS
G. UNDISTURBED EARTH
H. 5" X 5" COMPACTED SUBGRADE
I. ELECTRONIC MARKER DEVICE (EMD) 12" ABOVE TOP OF PIPE.
   SEE STANDARD SPECIFICATION SECTION 170.

BENTONITE SPECIFICATIONS:
MERGULL BENTONITE BY W.R. HEN, INC. OR APPROVED EQUAL
BARREL YIELD: 92
VISCOSITY READING AT 600 R.P.M.: 30 ± 5
WATER LOSS: 13.5 ± 1
% THRU 200 MESH SCREEN: 80 ± 2
WET SCREEN ANALYSIS RESIDUE ON U.S. SERIES NO. 200: 3.0 ± 0.5
% MOISTURE: 7 ± 1
pH: 9.1 ± 0.1
GEL STRENGTH - 10 SEC.: 16 ± 2
GEL STRENGTH - 10 MIN.:
FLUIDITY VISCOITY: 14 ± 2
YIELD POINT, LB/200 FT.: 16 ± 4
MIX 80 LBS. PER 100 GALLONS OF MAKE-UP WATER.
GENERAL NOTES
1. ALL SOIL COMPACTION FOR INSTALLATION OF SERVICE WYE TO BE 95% OF MAXIMUM DRY DENSITY PER ASTM D 1557.

CONSTRUCTION NOTES
A. EXISTING VACUUM SEWER MAIN
B. SCHEDULE 40 PVC PIPE LENGTH TO BE GREATER THAN COMPRESSION COUPLING.
C. SOLVENT WELD AT SHOP
D. SEE STANDARD DRAWING 2163
E. SCHEDULE 40 PVC WYE (P x P x P)
   SEE STANDARD DRAWING 2163
F. COMPRESSION COUPLING AS PER AUTHORITY SPECIFICATION
G. SLIP COMPRESSION COUPLING ONTO THIS PIECE OF PIPE
   BEFORE INSERTING IN TRENCH
H. SOLVENT WELD IN FIELD
GENERAL NOTES
1. SEE CONSTRUCTION PLANS AND SPECIFICATIONS FOR SKIRT TYPE AND SECTION CONFIGURATION (STANDARD, CENTERED AND RESTRAINED) AS SHOWN FOR SECTION A-A.

CONSTRUCTION NOTES
A. CARRIER PIPE
B. PIPELINE SUPPORT SKIRT (SEE CONSTRUCTION PLANS AND SPECIFICATIONS FOR SIZES AND MODEL NUMBERS).
C. STEEL CASING (SIZE AND THICKNESS PER CONSTRUCTION PLANS AND SPECIFICATIONS).
D. CASING END SEAL (SEE CONSTRUCTION PLANS AND SPECIFICATIONS FOR SIZES AND MODEL NUMBERS).

SECTION A-A

PLAN

WATER AUTHORITY
VACUUM SEWER CASING DETAIL FOR BORE AND JACK

REVISIONS
DWG. 2180 JAN. 2013
GENERAL NOTES

CONSTRUCTION NOTES
A. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2128.
B. 12" DIAMETER POLYMER COATED STEEL PIPE GWP.
C. GATE VALVE WITH PEWTER COLLECTING NUT, SEE STANDARD DRAWING 2169.
D. COMPACTED BACKFILL, SOIL, OR BASE COURSE MATERIAL (50% COMPACTION). SEE SECTION 701.
E. CONCRETE COLLAR PER STANDARD DRAWING 2461.
F. F = 3000 psi.
G. TOP OF CONCRETE COLLAR SHALL BE STAMPED WITH LINE SIZE AND FLOW DIRECTION ARROWS. MINIMUM LETTER SIZE SHALL BE 3" IN HEIGHT.
H. ELECTRONIC MARKER DEVICE (EDM). SEE STANDARD SPECIFICATION SECTION 170.
I. REBAR, SEE STANDARD DRAWING 2461.
GENERAL NOTES
1. **LEGAL REQUIREMENTS: BEFORE THE WORK WILL BE ACCEPTED:**
   SITES AND GROUND COORDINATES SHALL BE PROVIDED ON THE
   RECORD DRAWINGS. GPS COORDINATES OBTAINED BY A
   PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF NEW
   MEXICO SHALL BE TAKEN AT THE VALUE OPERATING NUT. USE
   THE NAD 83 NH50 STATE PLANE CORDINATE FOR X AND Y
   COORDINATES AND NAVD 1988 FOR Z COORDINATE.

CONSTRUCTION NOTES
A. CONCRETE COLLAR PER STANDARD DRAWING 2461 (F = 4000 psi)
   INSURE CONCRETE SURFACE WITH SIZE OF FORCEMAIN LINE AND
   DIRECTION OF FLOW PER STANDARD DRAWING 2181. IN PAVED
   AREAS, INSTALL COLLAR FLUSH WITH PAVEMENT IN UNPAVED
   AREAS, SET RING 1" ABOVE GRADE AND SLIDE TOP OF
   CONCRETE DOWN TO 1" BELOW GRADE.
B. 24" DIAMETER POLYMER COATED STEEL PIPE CMP
C. 24" MANHOLE FRAME AND COVER PER STANDARD DRAWING 3109.
D. FLUSH POINT (GALVANIZED)
E. BALL VALVE (NORMALLY CLOSED)
F. PIPE ADJUSTMENT FOR LINE DEPTH (PVC)
G. BALL CHECK VALVE
H. Threaded to Glued Adapter
J. GALVANIZED PIPE
K. 24"x6" CONCRETE COLLAR WITH SAFETY WRAP AROUND PIPE
L. GLUE TO THREADED ADAPTER
M. 45° ELBOW
N. WYE
P. FORCEMAIN SEWER LINE
Q. COMPACTED BACKFILL SOIL OR BASE COURSE MATERIAL (95% COMPACTION). SEE SECTION 701
R. ELECTRONIC MWD DEVICE (EMD), SEE STANDARD SPECIFICATION
   SECTION 770.
S. #4 REBAR, SEE STANDARD DRAWING 2461.
T. 1/2" TO 3/4" GRAVEL, FILL BOX TO BELOW VALVE HANDLE IN
   OPEN POSITION.

NOTES:
1) SCHEDULE 40 PVC NOT ALLOWED
2) FLUSH POINT ADAPTERS SHOULD MATCH SIZE OF MAIN LINE
   (2" PIPE SHOWN)

FLUSHING CONNECTION
SECTION

REVISIONS WATER AUTHORITY
FORC MAIN SEWER
LOW PRESSURE SANITARY SEWER
(LPSAS) FLUSHING CONNECTION
Dwg. 2182 JAN. 2013
CONSTRUCTION NOTES

A. PVC LOW PRESSURE STORM SEWER MAN (LPSSM) SCHEDULE 40 NOT ALLOWED.
B. 45° BEND
C. EXISTING MANHOLE, TYPE "E" SHOWN.
D. 0.10 FT. DROP ACROSS MANHOLE WALK.
E. 8" GRAVITY SEWER
F. CONCRETE, SEE SECTION 101
G. FORMED GROUT CHANNEL
H. ELECTRONIC MANHOLE DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 110. DEPTH PLACEMENT PER MANUFACTURER'S RECOMMENDATIONS.
J. APPROPRIATE WATERSTOP TO BE COMPATIBLE WITH TYPE OF PIPE.
GENERAL NOTE
1. GAS SERVICE LINES SHALL BE CONSTRUCTED USING SCHEDULE 80 PVC PIPE.

CONSTRUCTION NOTES
A. SANITARY SEWER PIPING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2126.
B. PVC LOW PRESSURE SANITARY SEWER MAIN (UPSAS).
C. PVC WYE
D. PVC REDUCER (AS REQUIRED)
E. GATE VALVE WITH PENTAGONAL OPERATING NUT. SIZE PER SERVICE
F. CHECK VALVE. SIZE PER SERVICE
G. TEMPORARY CAP
H. FUTURE PVC LINE FROM OWNER FURNISHED GRINDER PUMP
SEWER MANHOLE – PLAN VIEW
NOT TO SCALE

GENERAL NOTES:
1. TRACE WIRE SHALL BE INSTALLED ON TOP OF PIPE AS SHOWN IN SECTION A-A ON STANDARD DRAWING 2190.
2. TRACE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC BANDING AT INTERVALS.
3. TEST STATION CAP AND TRACE WIRE SHALL BE COLORED GREEN (APIA STANDARDS).

CONSTRUCTION NOTES:
A. CONCRETE COLLAR PER STANDARD DRAWING 2461
B. MARKER TAPE
C. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
D. TRACE WIRE #12 AWG COPPER CLAD STEEL – GREEN
E. TRACE WIRE #12 AWG COPPER CLAD STEEL – RED, FACTORY CONNECTED TO GROUNDING ANODE.
F. TRACE WIRE SHALL BE ROUTED AROUND MANHOLE HOLES ON THE NORTH OR EAST SIDE.
G. TEST STATION ACCESS BOX WITH GREEN COLOR CODED (APIA STANDARDS). CAP SHALL BE INSTALLED IN CONCRETE COLLAR, ON NORTH OR EAST SIDE OF MANHOLE, AVOID CONNECTING HEAVY RING IN COLLAR. TEST STATIONS SHALL BE INSTALLED APPROPRIATELY TO ADAPT TO TEST STATIONS, IN ORDER TO APPROPRIATE FOR CRAFT IN PLACE CONCRETE APPLICATIONS. MAINTAIN WIRE LEAD AND GROUND WIRE FROM THE MAGNETIC GROUNDING ANODES, SHALL BE CONTINUOUS TO THE TERMINALS IN THE TEST STATION, DO NOT CUT MAIN LINE TRACE WIRE. TEST STATION SHALL BE PLUMB WITH TOP OF CONCRETE TO PREVENT FLOWING OF WATER. (SEE TEST STATION SECTION VIEW, THIS SHEET)
H. DRIVE-IN MAGNETIC GROUNDING ANODE, INSTALL WITH MARKER AT HOUSING SEPARATION FROM TEST STATION ACCESS BOX. INSTALL AT DEPTH OF MAIN TRACE WIRE. (SEE ANODE DETAIL, STANDARD DRAWING 2190)
I. TAPE OR PLASTIC TIE (SEE GENERAL NOTE 2)
J. TERMINAL JUMPER SHALL REMAIN DISCONNECTED UNDER NORMAL OPERATIONS. THE TERMINALS MAY BE USED TO CONNECT TRACE EQUIPMENT FOR TRACE AND POE GROUNDING. THE JUMPER SHALL BE CONNECTED AT THE EXTREME RIGS OF THE AREA TO BE TRACED TO PROPERLY GROUND THE AREA, THE TERMINAL JUMPER SHALL BE DISCONNECTED WHEN TRACE IS COMPLETED.
K. 2-TERMINAL GREEN COLOR CODED (APIA STANDARDS) CAP, APPROPRIATE FOR CRAFT IN PLACE CONCRETE APPLICATIONS
L. LEAVE 6 INCHES OF EXCESS SLACK RED AND BLUE TRACE WIRE INSIDE TEST STATION ACCESS BOX.
M. TEE CONNECTION, 3-WAY LOCKING WATERPROOF CONNECTOR. DO NOT CUT MAIN LINE TRACE WIRE. (SEE TEE CONNECTION DETAIL, STANDARD DRAWING 2190)
N. TYPE "C" MANHOLE PER STANDARD DRAWING 2101.
O. TYPE "E" MANHOLE PER STANDARD DRAWING 2102.
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(November 2019) 2300-1
GENERAL NOTES:
1. All new pipe and fittings shall be provided with thrust control.
2. Thrust control shall be by restrained joints only unless directed otherwise by engineer.
3. EMD's are required at valves, tees, flanged outlets (on concrete cylinder pipes), and capped or plugged ends. See specification section 170 for locations.

CONSTRUCTION NOTES:
A. Existing steel pipe.
B. Reduce at tee, if existing line is smaller than new line.
C. M.J., C.I. elbow with joint restraint.
D. New D.I. or P.V.C., with valve as directed.
E. Restrained transition coupling for A.C. restrained solid sleeve for D.I., C.I. and PVC.
F. Existing D.I., C.I., P.V.C., or A.C. If A.C., use adapter approved by engineer or as approved on the current Water Authority Approved Products List.
G. M.J. D.I. tee with joint restraint.
H. M.J., C.I. plug or cap with joint restraint.
J. Remove at least 10' of pipe to be abandoned and cap or plug.
GENERAL NOTES
1. TRACE WIRE SHOWN AWAY FROM PIPE FOR CLARITY. TRACE WIRE SHALL BE INSTALLED ON TOP OF PIPE AS SHOWN IN SECTION A-A.
2. TRACE WIRE SHALL BE FASTENED TO THE PIPE WITH TAPE OR PLASTIC TIES AT 6" INTERVALS.
3. TEST STATION CAP AND TRACE WIRE SHALL BE COLOR CODED PURPLE (APAHA STANDARD).

CONSTRUCTION NOTES
A. NON-POTABLE WATER MAIN
B. NON-POTABLE WATER MAIN CROSS
C. NON-POTABLE WATER LATERAL
D. TRACE WIRE #12 AWG COPPER CLAD STEEL – PURPLE, FASTENED TO TOP OF PIPE (SEE GENERAL NOTES) SEE SECTION A-A
E. TRACE WIRE #12 AWG COPPER CLAD STEEL – RED, FACTORY CONNECTED TO GROUNDING ANODE.
F. MARKER TAPE
G. TRACE WIRE SHALL BE ROUTED AROUND VALVES ON THE NORTH OR EAST SIDE (SEE STANDARD DRAWING 2325)
H. MAIN LINE SPACE: ONLY USE AS NEEDED AT END OF TRACE WIRE SPUR. CONDUCTORS SHALL TERMINATE AT ALL SPACE CONNECTIONS. (SEE SPACE DETAIL, THIS SHEET)
I. TEST STATION ACCESS BOX WITH PURPLE COLOR CODED (APAHA STANDARD) CAP SHALL BE INSTALLED IN CONCRETE COLLAR, ON NORTH OR EAST SIDE OF VALVE. TEST STATIONS SHALL BE INSTALLED APPROXIMATELY 100' APART. TEST STATIONS SHALL BE LOCATED IN PLACE CONCRETE APPLICATIONS, MAN TRACE WIRE AND LEAD GROUND TRACE WIRE FROM THE MAGNESIUM GROUNDING ANODE TO BE CONTINUOUS TO THE TERMINALS IN THE TEST STATION. DO NOT CUT MAIN LINE TRACE WIRE. (SEE STANDARD DRAWING 2325)
J. DRIVEN IN MAGNESIUM GROUNDING ANODE AT ALL TERMINATION/DEAD ENDS (INCLUDING EDGE OF RIGHT-OF-WAY AND CONSTRUCTION POINTS/TERMINAL ENDS OF REINFORCED SECTIONS). CONNECT TO MAIN LINE TRACE WIRE USING SPADE CONNECTION (SEE ANODE DETAIL, THIS SHEET)
K. TEE CONNECTION 3-WAY LOCKING WATERPROOF CONNECTOR DO NOT CUT MAIN LINE TRACE WIRE. (SEE TEE CONNECTION DETAIL, THIS SHEET)
L. CROSS CONNECTION TWO 3-WAY LOCKING WATERPROOF CONNECTORS WITH SHORT TRACE WIRE JUMPER. DO NOT CUT AND SPLICE MAIN LINE TRACE WIRE. (SEE CROSS CONNECTION DETAIL, THIS SHEET)
M. TRACE WIRE INSIDE NON-POTABLE WATER METER BOX/VALVE WITH 3" OF EXCESS/SLACK TRACE WIRE FOLDED IN THE CORNER OF THE METER BOX. DO NOT COIL. (SEE STANDARD DRAWING 2325)
N. SPADE CONNECTION (SEE SPADE DETAIL, THIS SHEET)
O. TRACE WIRE JUMPER
P. WATERPROOF STREET BURY LUG LOCKING CONNECTOR
Q. KNOT TWO CONNECTING TRACE WIRES TOGETHER
R. NON-POTABLE WATER VALVE BOX
S. NON-POTABLE WATER PLUMBING CONNECTOR
T. LOCKING WATERPROOF CONNECTOR
U. STAND ALONE TEST STATION (SEE STAND ALONE TEST STATION TRACE WIRE DETAIL, STANDARD DRAWING 2325)

TRACE WIRE SAMPLE PLAN (NON-POTABLE WATER)

LEGEND
- NON-POTABLE WATER METER
- VALVE
- TEST STATION WITH CONCRETE COLLAR
- DRIVE-IN MAGNESIUM GROUNDING ANODE
- TEST STATION
- TRACE WIRE
- NON-POTABLE WATER MAIN/LATERAL

REVISIONS
WATER AUTHORITY
SEP. 2017 NON-POTABLE WATER
TRACE WIRE SAMPLE PLAN
AND DETAILS
DWG. 2303 MAY 2019
GENERAL NOTES:
1 SEE PLAN AND PROFILE SHEETS FOR LENGTH IN FEET OF RIGID PIPE ON EITHER SIDE OF BEND.
2 CARE MUST BE EXERCISED NOT TO OVERHEAT RUBBER GASKET WHEN WELDING.

CONSTRUCTION NOTES:
A COMPLETE COIL PARALLEL TO END OF PIPE.
B FIELD WELD, CONTINUOUS.
C FIELD-APPLIED CEMENT MORTAR COATING.
D RUBBER GASKET.
E STEEL CYLINDER PORTION OF PIPE.
GENERAL NOTES:
1. MECHANICAL TAMPERs SHALL NOT BE USED IN THE INITIAL BACKFILL REGION FOR FLEXIBLE PIPE. WHEN FLEXIBLE PIPE IS USED, CONTRACTOR SHALL, PRIOR TO THE START OF CONSTRUCTION, PROVIDE THE PROPOSED COMPACTION METHOD IN THE INITIAL BACKFILL REGION TO THE WATER AUTHORITY FOR APPROVAL.
2. MINIMUM CLASS "C" BEDDING WILL BE USED.
3. ALL COMPACTION WILL BE TO 95% OF THE STANDARD PROCTOR.
GENERAL NOTES:
1. All thrust control by restrained joints only, unless directed by engineer, and for "special" situations specified by the Water Authority.
2. Pipe size greater than 14" requires design by engineer to be submitted to the Water Authority for approval.
3. Concrete blocking per Sec. 101 exterior concrete, f'c=3000 psi @ 28 days.

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<th>PIPE SIZE</th>
<th>ELBOW ANGLE</th>
<th>ELBOW (h) DIM.</th>
<th>TEE OR PLUG (h) DIM.</th>
<th>ELBOW (b) DIM.</th>
<th>TEE OR PLUG (b) DIM.</th>
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CONSTRUCTION NOTES:
A. Undisturbed earth.
B. O.D. of pipe + 8".
C. O.D. of cap or plug, min. 12" x 12".
D. Only for exceptional situations, use of mechanical restraints takes precedence.

WATER AUTHORITY
CONCRETE BLOCKING DESIGN
Dwg. 2310 January 2011
CONSTRUCTION NOTES
A. 6" x 6" SCHEDULE 40 GALVANIZED STEEL PIPE 6' LONG, FILLED WITH CONCRETE. EXPOSED STEEL SHALL BE PAINTED WITH AN OIL BASE ALKyd PRIMER AND AN OIL BASE ALKyd ENAMEL TOP COAT. COLOR SHALL BE "SAFETY YELLOW".
B. PAVERED, OR FINISHED GRADE.
C. 18" CONCRETE FOOTING. SEC. 101 EXTERIOR CONCRETE. F=3000 PSF AT 28 DAYS, WITH SMOOTH OR BROOK FINISH WHEN ADJACENT TO PAVEMENT.
GENERAL NOTES
1. WATER VALVE WITH TEST STATION SHALL ONLY BE USED IN AREAS THAT DO NOT HAVE ADEQUATE FIRE HYDRANT SPACING TO PROVIDE TEST STATIONS EVERY 1,000 FEET. IF FIRE HYDRANTS ARE ADEQUATELY SPACED, REFER TO STANDARD DRAWING 2340.
2. TRACE WIRE SHOWN AWAY FROM PIPE FOR CLARITY. TRACE WIRE SHALL BE INSTALLED ON TOP OF PIPE AS SHOWN IN SECTION A-A, ON STANDARD DRAWING 2302.
3. TRACE WIRE SHALL BE FASTENED TO THE TOP OF PIPE WITH TAPE OR PLASTIC TIES AT 6 INTERVALS.
4. TEST STATION CAP AND TRACE WIRE SHALL BE COLOR CODED BLUE (APMA STANDARDS).

CONSTRUCTION NOTES
A. CONCRETE COLLAR PER STANDARD DRAWING 2461
B. WATER MAIN
C. VALVE BOX PER STANDARD DRAWINGS 2326 AND 2328
D. MARKER TAPE
E. TRACE WIRE #12 AN COPPER CLAD STEEL - BLUE (SEE SECTION A-A ON STANDARD DRAWING 2302)
F. TRACE WIRE #12 AN COPPER CLAD STEEL - RED FACTORY CONNECTED TO GROUNDING ANCHOR
G. TRACE WIRE SHALL BE ROUTED AROUND VALVES ON THE NORTH OR EAST SIDE
H. TEST STATION ACCESS BOX WITH BLUE COLOR CODED (APMA STANDARDS) CAP INSTALL IN CONCRETE COLLAR. ON NORTH OR EAST SIDE OF VALVE ANGLED CONFЛИCT WITH REWM RING IN COLLAR. TEST STATIONS SHALL BE INSTALLED APPROXIMATELY 1000 FEET APART. TEST STATIONS SHALL BE APPROPRIATE FOR CAST IN PLACE CONCRETE APPLICATIONS. MAIN TRACE WIRE AND LEAD GROUND TRACE WIRE FROM THE MAGNESIUM GROUNDING ANCHOR SHALL BE CONTINUOUS TO THE TERMINALS IN THE TEST STATION. TEST STATIONS SHALL BE FLUSH WITH TOP OF CONCRETE TO PREVENT POOLING OF WATER. SEE TEST STATION SECTION VIEW SHEET.
I. DRIVE-IN MAGNESIUM GROUNDING ANCHOR INSTALL WITH MINIMUM 1 FT. HORIZONTAL EQUATION FROM TEST STATION ACCESS BOX INSTALL AT DEPTH OF MAIN TRACE WIRE. (SEE ANCHOR DETAIL STANDARD DRAWING 2302)
J. TAPE OR PLASTIC TIE (SEE GENERAL NOTES)
K. TEE CONNECTION, 5-WAY LOOKING WATERPROOF CONNECTOR DO NOT CUT MAIN LINE TRACE WIRE. (SEE TEE CONNECTION DETAIL STANDARD DRAWING 2302)

WATER AUTHORITY

REVISIONS
SEP. 2017
WATER TRACE WIRE SAMPLE PLAN AND DETAILS FOR WATERLINES WITHOUT FIRE HYDRANTS

DWG. 2324
AUG. 2019
GENERAL NOTES
1. TRACE WIRE SHALL BE INSTALLED ON TOP OF PIPE AS SHOWN ON SECTION A-A ON STANDARD DRAWING 2303.
2. TRACE WIRE SHALL BE FASTENED TO NON-PE ELBOW WITH TIE OR PLASTIC TIES AT 6 INCH INTERVALS.
3. ATTACH TRACE WIRE TO PE ELBOW WITH CLIPS. DO NOT USE ADHESIVE TAPE ON PE ELBOWS.
4. TEST STATIONS SHALL BE VISIBLE FROM ROAD.
5. TEST STATION CAP AND TRACE WIRE SHALL BE COLOR CODED PURPLE (AAMA STANDARD).

CONSTRUCTION NOTES
A. CONCRETE COLLAR PER STANDARD DRAWING 2461
B. NON-PE PLASTIC MAIN
C. VALVE BOX PER STANDARD DRAWINGS 2306 AND 2330
D. NIPPLE TIE
E. TRACE WIRE #12 AWG COPPER CLAD STEEL - PURPLE (SEE SECTION A-A ON STANDARD DRAWING 2303)
F. TRACE WIRE #12 AWG COPPER CLAD STEEL - RED
G. TRACE WIRE SHALL BE INSTALLED ON ELBOWS ON THE NORTH OR EAST SIDE.
H. TRACE WIRE INSTALLATON ON THE NORTH OR EAST SIDE.
I. TEST STATION INSTALLATIONS ARE MOUNTED ON WALL OR ENTRANCE.
J. INSTALLATION OF TRACE WIRE IS INSTALLED IN PLACE WITH PREPARED TRENCHES.
K. TEST STATION INSTALLATION ON THE NORTH OR EAST SIDE.
L. TRACE WIRE INSTALLATION ON THE NORTH OR EAST SIDE.
M. TRACE WIRE INSTALLATION ON THE NORTH OR EAST SIDE.
N. TRACE WIRE INSTALLATION ON THE NORTH OR EAST SIDE.
O. TRACE WIRE INSTALLATION ON THE NORTH OR EAST SIDE.

NOTE:
- THIS DETAIL IS TO BE USED WHERE NON-PE PLASTIC WATER LINE CROSS THE RIGHT-OF-WAY LINE WITHOUT NON-PE PLASTIC WATER METER. ALL LINES SHALL BE TRACED TO RIGHT-OF-WAY WITH GROUNDING ANODE AT RIGHT-OF-WAY.
GENERAL NOTES

CONSTRUCTION NOTES
A. RING AND COVER FOR VALVE BOX PER STANDARD DRAWING 2328. INSTALL ONE LINER RING AND COVER ON FIVE LINER PER STANDARD DRAWING 2329. AND NON-POTABLE RING AND COVER ON NON-POTABLE LINES PER DRAWING 2330.
B. 12" DIAMETER POLYMER COATED STEEL PIPE CMP
C. NEW OR EXISTING VALVE
D. COMPACTED BACKFILL SOIL OR BASE COURSE MATERIAL (6" DEEP COMPACTION). SIDE SECTION 701
E. CONCRETE COLLAR PER STANDARD DRAWING 2461.
F. TOP OF CONCRETE COLLAR SHALL BE STAMPED WITH WATERLINE SIZE AND DIRECTION. MINIMUM LETTER SIZE SHALL BE 3" IN HEIGHT AND THE LETTERS "PMP" FOR NON-POTABLE WATER VALVE INSTALLATIONS.
G. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
H. REBAR PER STANDARD DRAWING 2461.

SECTION

PLAN

WATER AUTHORITY

REVISIONS
JAN. 2015

WATER VALVE BOX

DWG. 2326

OCT. 2017
GENERAL NOTES – RING
1. ALUMINUM VALVE BOX RING DESIGNED TO ACCEPT AN ALUMINUM VALVE BOX COVER.
2. THE CASTING NUMBER, MANUFACTURER’S LOGO, DATE OF MANUFACTURE AND "USA" SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4" UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 2°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH REMOVE EXCESS IRON AND PIN.
6. THIS DETAIL DOES NOT APPLY FOR VALVE BOX RING AND COVER TO BE USED ON REUSE ON NON-PIPETABLE WATER SYSTEMS.
7. SEE STANDARD DRAWING 3328 FOR WATER LINE RING AND COVER.
8. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

GENERAL NOTES – COVER
1. ALUMINUM VALVE BOX COVER DESIGNED TO FIT INTO AN ALUMINUM VALVE BOX RING.
2. THE CASTING NUMBER, MANUFACTURER’S LOGO, DATE OF MANUFACTURE AND "USA" SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4" UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 2°-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH REMOVE EXCESS IRON AND PIN.
6. ONLY PRODUCTS CAST IN THE USA WILL BE ACCEPTABLE.

SECTION
VALVE BOX RING

SECTION
VALVE BOX COVER
GENERAL NOTES — RING
1. VALVE BOX RING DESIGNED TO ACCEPT A VALVE BOX COVER.
2. THE CASTING NUMBER, MANUFACTURER’S LOGO, DATE OF MANUFACTURE AND “USA” SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4" UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 2-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH REMOVE EXCESS IRON AND RIVETS.
6. THIS SEAL MEANS DOES NOT APPLY FOR VALVE BOX RING AND COVER TO BE USED ON POTABLE WATER SYSTEMS.
7. SEE STANDARD DRAWING 3230 FOR WATER RING AND COVER.
8. ONLY PRODUCTS CAST IN THE USA AND ON THE WATER AUTHORITY APPROVED PRODUCTS LIST WILL BE ACCEPTABLE.

GENERAL NOTES — COVER
1. VALVE BOX COVER DESIGNED TO FIT INTO VALVE BOX RING.
2. THE CASTING NUMBER, MANUFACTURER’S LOGO, DATE OF MANUFACTURE AND “USA” SHALL BE CAST IN A CONSPICUOUS LOCATION ON BOTH THE RING AND THE COVER.
3. FILLETS SHALL BE 1/4" UNLESS OTHERWISE SPECIFIED.
4. A DRAFT ANGLE OF 2-5° SHALL BE APPLIED UNLESS OTHERWISE SPECIFIED.
5. FINISH REMOVE EXCESS IRON AND RIVETS.
6. ONLY PRODUCTS CAST IN THE USA AND ON THE WATER AUTHORITY APPROVED PRODUCTS LIST WILL BE ACCEPTABLE.

REVIEWING TRAINEE

RING AND COVER ASSEMBLY

CONCRETE EXTENSION

REVIEWS
NON-POTABLE WATER RING AND COVER FOR VALVE BOX

WATER AUTHORITY

REVISIONS

DWG. 2350
JAN. 2015
GENERAL NOTES:
1. THE ENGINEER SHALL PROVIDE DESIGN FOR ALL VALVES GREATER THAN 12" AND BUTTERFLY VALVES.
2. ALL THRUST CONTROL BY RESTRAINED JOINTS ONLY UNLESS OTHERWISE DIRECTED BY ENGINEER.
3. USE FOR VALVE INSERTION INTO EXISTING LINES ONLY.
4. CONCRETE USED FOR VALVE ANCHORAGE PER SEC. 101 HYDRAULIC STRUCTURAL CONCRETE, \( f'c = 3000 \) psi @ 28 DAYS.
5. ALL JOINTS ARE TO BE MECHANICALLY RESTRAINED. THE MINIMUM RESTRAINED JOINT LENGTH SHALL BE 5 FEET ON EITHER SIDE OF THE VALVE.
6. NOT NEEDED FOR E-Z VALVE OR OTHER VALVE INSERTION THAT DOES NOT CUT THROUGH THE ENTIRE SECTION OF PIPE.
7. BEFORE THE WORK WILL BE ACCEPTED, WATER VALVE GPS COORDINATES SHALL BE PROVIDED ON THE RECORD DRAWINGS. GPS COORDINATES OBTAINED BY A PROFESSIONAL SURVEYOR LICENSED IN THE STATE OF NEW MEXICO SHALL BE TAKEN AT THE VALVE OPERATING NUT. USE THE NAD 1983 NM STATE PLANE CENTRAL ZONE FOR X AND Y COORDINATES AND NAVD 1988 FOR Z COORDINATE.

CONSTRUCTION NOTES:
A. TWO NO. 4 BARS FOR VALVE STRAPS WITH 3" HOOKS. HOOKS TO BE EMBEDDED BELOW BOTTOM OF PIPE. BARS TO BE COATED WITH BITUMINOUS MATERIAL TO PREVENT CORROSION.

<table>
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<th>b</th>
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NOTE:
1. Four guard posts (max.) required for each fire hydrant installation. A minimum of two guard posts is required for all fire hydrants facing public or private streets without standard curb and gutter. If two guard posts are used, they shall be placed on the street side of the hydrant.

FIRE HYDRANT GUARD POST DETAIL
FOR INSTALLATIONS WITHOUT CURB & GUTTER

GENERAL NOTES:
1. No obstructions will be permitted within 3' - 6" of fire hydrant.
2. Hydrant leg shall be valued.
3. Contractor shall be responsible for setting the top plaque of the fire hydrant to the controlled elevation line.
4. For fire hydrant locations, see standard drawing 2347.
5. When new or existing sidewalk exists curb, reconstruct sidewalk per standard drawings 2430 and 2431.
6. Pumper nozzle to be set facing the traveled way, unless otherwise noted on plans.
7. Hydrants installed in sidewalk areas shall maintain a free foot clear pedestrian path per ADA standards.
8. Before the work will be accepted, fire hydrant GPS coordinates shall be provided on the record drawings. GPS coordinates obtained by a professional surveyor licensed in the state of New Mexico shall be taken at the plume. Use the NAD 1983 WSM state plane central zone for x and y coordinates and NAD 1988 for z coordinate.
9. Hydrants installed without standard curb and gutter shall be protected with stationary posts/bollards. See detail on this sheet.

CONSTRUCTION NOTES:
A. Fire hydrant per specifications
B. Pumper nozzle 4 - 1/2"
C. Hose nozzle 2 - 1/2"
D. 1/2" expansion joint material
E. Watch sidewalk slope, or slope 1/4" per foot.
F. 3'-0" x 5'-0" square concrete pad to be constructed around fire hydrant's centerline when not located within sidewalk or concrete area. Concrete per Sec. 101 exterior concrete. C=500 psi @ 28 days.
G. Back of curb
H. Controlled elevation line, level in all directions.
J. Use of restrained joint is mandatory. All fire hydrant leg piping and fittings including tee on main shall be restrained joint.
K. 3'-0" x 5'-0" gravel drain socket with clean gravel, ASTM C33, No. 57. Line drain socket with geotextile fabric weighstock class 3.
L. Standard curb and gutter. If no curb and gutter is present, bollards are required for other type of curb and gutter. Special design is required.
M. Install fire hydrant isolation gate valve at tee on main. Install valve box per standard drawing 2328.
N. Electronic marker device (EMD), see standard specification section 170.

SECTION

WATER AUTHORITY
WATER
FIRE HYDRANT INSTALLATION

Revisions:
Dec. 2014
May 2013

WATER AUTHORITY
WATER
FIRE HYDRANT INSTALLATION

Dwg. 2340
Apr. 2019
**GENERAL NOTES**

1. Sampling stations shall be buried to a depth of 3'-0" to 3'-6", with a 1" cast iron, and a 1" iron discharge.

2. All stations shall be enclosed in a lockable, non-removable, aluminum-cast housing.

3. All working parts shall be brass and be removable from above ground with no digging.

**CONSTRUCTION NOTES**

A. Eclipse and sampling equipment or water authority approved equal. See location plan to left for placement on a standard valve box concrete collar.

B. Aluminum housing (shown open)

C. Copper vent tube with 1/4" pet cock (optional 1/4" ball valve) for drawing with manual hand pump.

D. Aluminum base buried in concrete min. 1/4" max. 1/2"

E. 6" thick concrete collar. F = 3000 lb in unpaved areas. Use standard 8" collar if valve is installed away from sampling station in paved area.

F. 1" galvanized steel exterior casing pipe

G. 3/4" MPT x copper elbow

H. 3/4" concrete copper K-type, or water authority approved equal.

J. 3/4" MPT x copper flare, Ford C23-33 or water authority approved equal.

K. Curved stop per water authority approved products list.

L. Corporation stop per water authority approved products list.

M. Valve box per standard drawing 2328.

N. Ring and cover for valve box per standard drawing 2328.

P. Electronic marker device (EMD), see standard specification section 170.

Q. Connect to main

*The Eclipse #80 is a non-draining unit that comes standard with an all-surgical stainless steel waterway and a lockable cast-aluminum enclosure. Unit is manual-draining, non-freezing with use of an attachable manual hand pump (not shown to left). The Eclipse #80 is fully serviceable from above ground.*
GENERAL NOTES
1. SAMPLING STATIONS SHALL BE BURIED TO A DEPTH OF 3'-6" TO L" WITH A 1" MIN. FLOOR AND A 1" MIN. DISCHARGE.
2. ALL STATIONS SHALL BE ENCLOSED IN A LOCKABLE, NON-REMOVABLE, ALUMINUM-CAST HOUSING.
3. ALL WORKING PARTS SHALL BE BRASS AND BE REMOVABLE FROM ABOVE GROUND WITH NO DUGING.

CONSTRUCTION NOTES
A. ECLIPSE #83 SAMPLING SYSTEM, OR WATER AUTHORITY APPROVED EQUAL.
B. ALUMINUM HOUSING (SHOWN OPEN).
C. COPPER VENT TUBE WITH 1/4" PET COCK (OPTIONAL 1/4" BALLOON VALVE) FOR DRAINING WITH MANUAL HAND PUMP.
D. ALUMINUM BASE ERECTED IN CONCRETE MIN. 1/4" MAX. 1/2".
E. 2'-0"x 4" THICK CONCRETE PAD. F = 3000 PSI.
F. 1" GALVANIZED STEEL EXTERIOR CASING PIPE.
G. 3/4" MIP x COPPER ELBOW.
H. 3/4" DOMESTIC COPPER K-TYPE, OR WATER AUTHORITY APPROVED EQUAL.
J. 3/4" MIP x COPPER ELBOW, FORD C20-33 OR WATER AUTHORITY APPROVED EQUAL.
K. CURBSTOP PER WATER AUTHORITY APPROVED PRODUCTS LIST.
L. VALVE BOX / CURB BOX EXISTING.
M. APPROVED PRODUCT VALVE BOX OR CURB BOX - FORD PL 6AE-30-50 OR WATER AUTHORITY APPROVED EQUAL.
N. ELECTRONIC WATER LEVEL (EHW), SEE STANDARD SPECIFICATION SECTION 170.
P. CONNECT TO SERVICE LINE.

* THE ECLIPSE #83 IS A NON-DRAINING UNIT THAT COMES STANDBOOT WITH A MIN. STEEL WATERWAY AND A LOCKABLE CAST ALUMINUM HOUSING. UNIT IS MANUAL-FILLING, NON-FREEZING WITH USE OF AN ATTACHABLE MANUAL HAND PUMP (SEE DETAIL TO LEFT). THE ECLIPSE #83 IS FULLY SERVICEABLE FROM ABOVE GROUND.
GENERAL NOTES
1. INSTALL ALL RELEASE HYDRANT AS REQUIRED BY ENGINEER'S DESIGN PLANS.
2. REFER TO STANDARD DRAWING 2340 FOR COMPLETE FIRE HYDRANT INSTALLATION DETAILS.
3. USE OF RESTRAINED JOINTS IS MANDATORY. ALL FIRE HYDRANT LEG/PUMP AND FITTINGS INCLUDING TEE ON MAIN SHALL BE RESTRAINED JOINT.

CONSTRUCTION NOTES
A. WATER MAIN
B. FLANGED OUTLET OR MECHANICAL JOINT TEE
C. DUCTILE IRON 45 DEG. OR 90 DEG. BEND
D. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 175
E. GATE VALVE WITH VALVE BOX PER STANDARD DRAWING 2326
F. SLOPE WATER LINE UP TO AIR RELEASE/HYDRANT
G. FIRE HYDRANT PER STANDARD DRAWING 2340

SECTION
GENERAL NOTES
1. THIS DETAIL PERTAINS TO NEW INFRASTRUCTURE AND IS NOT TO BE USED AS A RELOCATION PLAN FOR EXISTING INFRASTRUCTURE. FINAL DESIGN AND LAYOUT OF VALVE LOCATIONS SHALL BE APPROVED BY THE WATER AUTHORITY TO CONFORM WITH SPECIFIC SYSTEM AND SITE REQUIREMENTS. ENGINEER SHALL COORDINATE DESIGN WITH THE INTERSECTION AND ALL RELATED SYSTEMS. DESIGN MUST BE APPROVED BY THE WATER AUTHORITY AND ALL PARTIES INVOLVED WITH THE INTERSECTION PRIOR TO CONSTRUCTION.
2. SEE STANDARD DRAWING SECTION 2400 FOR PAVING, AND SECTION 2500 FOR TRAFFIC/INTERSECTION DETAILS.
3. GREY BACKGROUND LINES MARK EXISTING VALVES LOCATION. DEPENDING ON THE INTERSECTION, THIS DESIGN WILL VARY.
4. PAVEMENT STRIPING SHOWN IS DIAGRAMATIC ONLY.

CONSTRUCTION NOTES
A. VALUE INSTALLATION PER STANDARD DRAWING 2228 AND RELATED.
CASE 1
(PARKWAY BEHIND CURB AND GUTTER)

CASE 2
(SIDewALK BEHIND CURB AND GUTTER)

GENERAL NOTES:
1. Fire Hydrants are not to be located within the curb return area. Fire Hydrants located in the red block length shall be centered on adjoining property lines, unless otherwise specified.

2. A minimum clearance of 3' shall be provided between fire hydrant and any permanent obstruction (utility pole, light standards, traffic signal, etc.).

3. For fire hydrant installation details, see standard drawing 2340.

CONSTRUCTION NOTES:
A. Fire Hydrant and pad
B. Right-of-Way or Easement line
C. Property line
D. Permanent obstruction
E. Parkway
F. Sidewalk
G. PC or PT of curb return
H. Maintain a minimum clearance of 3' radius from center of hydrant to any and all obstructions.
GENERAL NOTES
1. CAN LOCATION, FINAL DESIGN AND LAYOUT SHALL BE APPROVED BY THE WATER AUTHORITY TO CONTAIN WITH SPECIFIC SYSTEM AND SITE REQUIREMENTS. ENGINEER SHALL SIGN A PROJECT SPECIFIC DETAIL SUBMIT DRAWINGS OF VALVE OR MANHOLE, MAIN PIPING, AND CAN VALVE ASSEMBLY PRIOR TO VALVE FABRICATION AND PIPE INSTALLATION. IF LOCATED IN ROADWAY, COORDINATE THE PROPOSED VALVE LOCATION WITH ANY FUTURE ROADWAY IMPROVEMENTS.
2. MINIMUM MANHOLE INNER DIAMETER IS 60 IN.
3. ALL PARTS WITHIN THE MANHOLE MUST CONFORM TO THE CURRENT WATER AUTHORITY APPROVED PRODUCTS LST.
4. WATER MAIN INTERIOR PIPING SHALL BE STEEL PIPE, ELECTRIC FLEX PIPE OR CONCRETE COLUMNS PIPE.
5. ALL CAN VALVE ASSEMBLY, PIPING AND FITTINGS SHALL BE SUCH THAT IS THREADED TYPE 316 STAINLESS STEEL. SCREWBALL SHALL BE SPECIFIC CAN VALVE TO BE INSTALLED.
6. IN SHALLOW GROUNDWATER CONDITIONS, ENGINEER SHALL PROVIDE A WATERPROOF MANHOLE OR VALVE DESIGN THAT ACCOMMODATES FOR BUDGET AND NAVIGATION. FOR EXAMPLE, WITH FLOOR SLABS AND WITHOUT DRAIN HOLES, DO NOT CONSTRUCT WITH OPEN BOTTOM. DESIGN SHALL BE APPROVED BY THE WATER AUTHORITY PRIOR TO INSTALLATION.

CONSTRUCTION NOTES
A. COMPACTED SURFACE, SEE SECTION 701, OVERT-DRAINAGE TO 12" BELOW FOUNDATION. SIZE DENSITY PER ASTM B 553.
B. 8' X 16' X 6'10" CONCRETE FOUNDATIONS. STRUCTURAL DESIGN TO BE PROVIDED BY CONSULTING ENGINEER. ALTERNATIVE OPTION 1: INSTALL FOUNDATIONS ABOVE PIPE AND SET PRECAST 5 FT. ANGLE MANHOLE SECTION(S) ON TOP.
C. 5 FT. X 10' (Wk) PRECAST CONCRETE MANHOLE SECTIONS USE NKT30 GASKETS AND APPLY NON-DRYING CEMENT TO EXTERIOR AND INTERIOR OF EXPANSION JOINTS.
D. GROUT FILLER AROUND BASE(S).
E. PRECAST CONCRETE TOP SLAB FOR MANHOLE STANDARD ESM 2107. EXCEPT DESIGN WITHIN MANHOLE MINIMUM.
F. ELECTRONIC MARKER DEVICES (EMD), SEE STANDARD SPECIFICATION SECTION 170.
G. USE CONCRETE ADJUSTMENT RINGS FOR ADJUSTMENT OF MANHOLE FRAME TO PAVEMENT GRADE.
H. 3' X 3' SINGLE LEAF ACCESS HATCH WITH AIR HOLES. IF LOCATED IN ROADWAY, SPECIFY USE LOAD LEVEL III (ASTM C1503-14) FULL TRAFFIC RATED HATCH WITH CAST IRON LID. SPECIFY SPRINGS ASSEMBLED IN A MANHOLE, ORIENT FLAT OPENING SIDE AS SHOWN TO ALLOW ACCESS TO CAN.
I. RECTANGULAR CONCRETE COLLAR WITH NO. 4 REBAR, REFER TO STANDARD DRAWING 2401, EXCEPT FOR SHAPES OF COLLAR.
J. K. 12" CONCRETE COLLAR SHALL BE STAMPED WITH WATER LINE SIZE AND DIRECTION, AS WELL AS THE LETTERS "CAV" WITH THE CAN RELEASE VALVE SIZE. SEE EXAMPLE IN PLAN VIEW THAT SHOWN. MINIMUM LETTER SIZE SHALL BE 0.3" IN HEIGHT AND ADD THE LETTERS "CAV" FOR NON-PERMANENT WATER INSTALLATIONS.
L. FILL ANNUAL SPACE WITH NON-SHRINKING GROUT OR WATER AUTHORITY APPROVED EQUAL. UTILIZE WALL FLANGE IN SHALLOW GROUNDWATER CONDITIONS.
M. 1 IN. CLEAN (PER FRA) GRAVEL, ASTM C553, NO. 57. FILL MANHOLE UP TO SPRINKLING OF MAIN PIPE.
N. LACKERS TO BE INSTALLED IN MANHOLES DEGREASED OR EVEN TO 4 FT. DEPTH FOR STD DRAWING 2330. IF INSTALLS, LACKERS SHALL BE PLACED ONCE INNER SIZE OF HATCH TO ALLOW ACCESS TO CAN.
O. THREADED NIPPLE, TYPE 316 STAINLESS STEEL.
P. BALL VALVES, SIZE THE SAME AS CAN VALVE.
Q. TEE, SAME SIZE AS CAN VALVE.
R. THREADED NIPPLE FOR HOSE, GRAN, OR GAUGE CONNECTOR.
S. COMBINATION VALVE ASSEMBLY (FL), SEE PIPING PLANS. EXCEPT STRUCTURAL SUPPORTS AS NECESSARY. IF A HORIZONTAL COMBINATION IS USED.
T. ROUTE AN VALVE VENT PIPING FROM MAIN MANHOLE OR TOP SLAB, AND MOUNT WITH UNBUTT FIVE BRACKET.
PLAN

BUTTERFLY VALVE INSTALLATION DETAIL IN NEW CONCRETE CYLINDER PIPELINE

PIPE SCHEDULE

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SIDE VIEW

HAND WHEEL WITH 3" OPERATING NUT DETAIL

GENERAL NOTES

1. VAULT LOCATION, FINAL DESIGN AND LAYOUT SHALL BE APPROVED BY THE WATER AUTHORITY TO CONFORM WITH SPECIFIC SYSTEM AND SITE REQUIREMENTS. ENGINEER SHALL SUBMIT A PROJECT SPECIFIC DETAIL. SUBMIT SHOP DRAWINGS OF VAULT, MAIN piping, AND VALVE ASSEMBLY PRIOR TO VAULT FABRICATION AND PIPE INSTALLATION. IF LOCATED IN ROADWAY, COORDINATE THE PROPOSED VAULT LOCATION WITH ANY FUTURE ROADWAY IMPROVEMENTS.

2. THIS DETAIL IS TO BE USED FOR NEW OR EXISTING CONCRETE CYLINDER PIPE ONLY.

3. PRIOR TO CONSTRUCTION OF REPAIRS OR VALVE INSTALLATIONS ON EXISTING CONCRETE CYLINDER PIPE, ALL REPAIRS AND/OR VALVE INSTALLATION DETAILS SHALL BE SUBMITTED TO, AND APPROVED BY THE WATER AUTHORITY.

4. SEE STANDARD DRAWING 2334 FOR LARGE DIAMETER ISOLATION VALVE VAULT DETAILS.

5. IN SHALLOW GROUNDWATER CONDITIONS, ENGINEER SHALL PROVIDE A WATERPROOF VALVE DESIGN THAT ACCOMMODATES FOR INSULATION AND INSULATION. FOR EXAMPLE, WITH FLOOR SLAB AND WITHOUT PAVEMENT, DO NOT CONSTRUCT WITH OPEN BOTTOM. DESIGN SHALL BE APPROVED BY THE WATER AUTHORITY PRIOR TO INSTALLATION.

CONSTRUCTION NOTES

A. NEW CONCRETE CYLINDER PIPE (CCP) WITH FLANGED END.

B. NEW 3 FT LONG RIGHT-IRON PIPE CCP (FLIP) WITH THICKENED PLAN END FOR MEFS-BFLG CONNECTION.

C. INSULATING FLANGE KIT, IF REQUIRED.

D. BUTTERFLY VALVE (FLIP) AND VALVE OPERATOR WITH HAND WHEEL, FLOW 3 IN SQUARE OPERATING NUT TO HAND WHEEL. SEE SIDE VIEW DETAIL, BELOW.

E. EXISTING CCP WITH PLAN END (PE)

F. BUTT STRAP X FLANGED END STEEL WRIAL.

G. BUTT STRAP ON CCP PIPE DO NOT INSTALL IF EXISTING FLANGE EXISTS AT VAULT LOCATION.

H. VALVE BOX AND COVER PER WATER AUTHORITY STANDARD DRAWING 2336.

I. MEGA-FLANGE FLANGE ADAPTOR, SERIES 2101 AS MANUFACTURED BY EMBRACON, ON EQUAL PER WATER AUTHORITY APPROVED PRODUCTS LIST.

J. COAT ALL EXPOSED STEEL SURFACES WITH AN ENGINEER APPROVED PRODUCT, OR ONE FROM THE CURRENT WATER AUTHORITY APPROVED PRODUCTS LIST.

ABBREVIATIONS

CCP = CONCRETE CYLINDER PIPE
FL = FLANGED
MC = MECHANICAL JOINT
PE = PLAN END
ST = STEEL

WATER AUTHORITY

WATER CONCRETE CYLINDER PIPE IN-VAULT BUTTERFLY VALVE INSTALLATION

Dwg 2351

JAN. 2011
JUN. 2019
AUG. 2019
GENERAL NOTES

1. VAULT LOCATION, FINAL DESIGN AND LAYOUT SHALL BE APPROVED BY THE WATER AUTHORITY TO CONFORM WITH SPECIFIED SYSTEM AND SITE REQUIREMENTS. ENGINEER SHALL SUBMIT A PROJECT SPECIFIC DETAIL, SUBMIT SHOP DRAWINGS OF VAULT, MAIN PIPING, AND VALVE ASSEMBLY PRIOR TO VAULT FABRICATION AND PIPE INSTALLATION. IF LOCATED IN ROADWAY, COORDINATE THE PROPOSED VAULT LOCATION WITH ANY FUTURE ROADWAY IMPROVEMENTS.

2. THE DETAIL IS TO BE USED FOR NEW OR EXISTING DUCTILE IRON PIPE ONLY.

3. PRIOR TO CONSTRUCTION OF REPAIRS OR VALVE INSTALLATIONS ON EXISTING DUCTILE IRON PIPE, ALL REPAIR AND/OR VALVE INSTALLATION DETAILS SHALL BE SUBMITTED TO, AND APPROVED BY THE WATER AUTHORITY.

4. SEE STANDARD DRAWING 2334 FOR LARGE DIAMETER ISOLATION VALVE DETAIL.

5. IN SHALLOW GROUNDWATER CONDITIONS, ENGINEER SHALL PROVIDE A WATERPROOF VAULT DESIGN THAT ACCOMMODATES FOR SUBSIDENCE AND INFLATION, FOR EXAMPLE, WITH FLOOR SLOPES AND WITHOUT DRAIN HOLES. DO NOT CONSTRUCT WITH OPEN BOTTOM DESIGN SHALL BE APPROVED BY THE WATER AUTHORITY PRIOR TO INSTALLATION.

CONSTRUCTION NOTES

A. EXISTING DIP WITH FLANGE (FE)
B. SOLID SLIDE (WJ)
C. DUCTILE IRON PIPE (IP) SPIRAL (PLATE)
D. BUTTERFLY VALVE (PLATE) AND VALVE OPERATOR WITH HAND WHEEL, MODEL 2 IN SQUARE OPERATING NUT TO HAND WHEEL. SEE SIDE VIEW (DETAIL BELOW).
E. VALUE BOX AND COVER PER WATER AUTHORITY STANDARD DRAWING 2330.
F. AIR RELEASE NIPPLE WITH SHUT VALVE

ABBREVIATIONS

DD = DUCTILE IRON PIPE
PL = PLATED
MJ = MECHANICAL JOINT
FE = FLANGE END
ST = STEEL

REVISIONS

WATER AUTHORITY

WATER DUCTILE IRON PIPE IN-VAULT BUTTERFLY VALVE INSTALLATION

DWG. 2352
JAN. 2011
JUN. 2019
AUG. 2019
GENERAL NOTES:
1. Size, electric and mechanical appurtenances and outlet discharge point as required by the water authority.
2. All above surface piping shall be painted safety yellow.
3. Bollards will be required when required by the engineer or the water authority.
4. Not to be used in traffic areas.
5. Do not construct drain pockets when constructing in shallow groundwater conditions. Engineer shall provide a waterproof manhole or vault design for approval by the water authority prior to installation.

CONSTRUCTION NOTES:
A. Valve box per C.O.A. Std. DWG. 2326.
B. Valve box ring and cover per C.O.A. Std. DWG. 2328.
C. Gate valve (FL – FL).
D. 1/2" connections with petcock for pressure measuring devices.
E. 6" diameter floor drain hole through slab.
F. 1/2 cu. yd. coarse gravel, ASTM C33, No. 57 gravel.
G. 2" sleeve for conduit.
H. Pavement.
J. Reinforced concrete slab, slope to drain. Concrete per Sec. 101, Hydraulic structural concrete, Fr=3000 psi @ 28 days.
K. Reinforced concrete pedestal, concrete per Sec. 101, exterior concrete, Fr=3000 psi @ 28 days.
L. 30 lb. felt between fitting or valve and pedestal.
M. C/L/D.I. 45° ELL. (FL – FL).
N. C/L/D.I. pipe (FL – FL).
P. Precast concrete cover, see DWG. 2107, except opening shall be 34" diameter minimum.
Q. C/L/D.I. 90° ELL. (FL – FL).
R. Anchor straps 3/8"x2".
S. Cover opening with 1/2" hardware cloth, secure to end of ell with 6-3/8"x2" bolts, nuts, and washers.
T. Concrete splash pad to be designed for each site, with welded wire fabric reinforcement. Concrete per Sec. 101, exterior concrete, Fr=3000 psi @ 28 days.
U. 4-5/8"x10" anchor bolts.
V. 6"-0" dia. type "C" manhole, per C.O.A. Std. DWG. 2101.
W. 4"x4" Bilco door as approved by the engineer or the water authority.
X. 1" tap and valve for drain.
Y. Non-shrink grout.
Z. Electronic marker device (EMD), see C.C.A standard specification section 170.

REVISIONS
WATER AUTHORITY
WATER SURGE RELIEF VALVE STATION
DWG. 2353 JANUARY 2011
### TIE ROD SCHEDULE

<table>
<thead>
<tr>
<th>Pipe Dia. (In.)</th>
<th>Min. Pipe Wall Thickness (In.)</th>
<th>Tie Rods</th>
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**NOTES:**

1. THE CONTRACTOR SHALL DETERMINE THE LENGTH "J" (COUPLING BOLT LENGTH) FROM MANUFACTURER'S CATALOGS USING THE SPECIFIED MIDDLE RING LENGTH.
2. "C" = MANUFACTURER'S RECOMMENDED SPACE BETWEEN ENDS OF PIPE.
3. "C" = J+Z+1 INCH, ROUND THIS VALUE UP TO NEXT EVEN INCH MINIMUM. (FOR Z DIMENSIONS, SEE LUG SCHEDULE.)
4. TIE ROD LENGTH = 2L+2C+G.

### LUG SCHEDULE

<table>
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<tr>
<th>Stud Dia</th>
<th>T</th>
<th>W</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
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<td>3-1/8</td>
<td>3-1/4</td>
</tr>
</tbody>
</table>

**NOTES:**

1. LUG SCHEDULE DIMENSIONS IN INCHES.
2. TIE RODS SHALL CONFORM TO ASTM A193 GRADE B7.
3. NUTS SHALL CONFORM TO ASTM A194 GRADE 2H.
4. PLATE SHALL CONFORM TO ASTM A283 GRADE D.
5. TIE ROD NUTS SHALL BE TIGHTENED GRADUALLY AND EQUALLY IN STAGES TO PREVENT UNEVEN ALIGNMENT AND TO ALLOW EQUAL STRESS ON ALL TIE RODS UNDER PRESSURE. TIGHTEN UNTIL SNUG. THREADS SHALL PROTRUDE FROM NUTS. PEEK THREADS AFTER TIGHTENING NUT.
6. TIE ROD LUGS SHALL BE SPACED EQUALLY AROUND PIPE.
8. TIE RODS SHALL NOT BE ATTACHED TO A PIPE WHEN THE WALL THICKNESS IS LESS THAN THE MINIMUM SHOWN ON THE TIE ROD SCHEDULE.
9. FOR ALL BURIED ASSEMBLIES, COAT WITH AN ENGINEER APPROVED PRODUCT OR AS APPROVED ON THE CURRENT WATER AUTHORITY APPROVED PRODUCTS LIST.
GENERAL NOTES
1. THIS DETAIL IS TO BE USED FOR NEW OR EXISTING DUCTILE IRON PIPE ONLY.
2. PRIOR TO CONSTRUCTION OF REPAIRS OR VALVE INSTALLATIONS ON EXISTING DUCTILE IRON PIPE, ALL REPAIR AND/OR VALVE INSTALLATION DETAILS SHALL BE SUBMITTED TO, AND APPROVED BY THE WATER AUTHORITY.

CONSTRUCTION NOTES
A. EXISTING DIP WITH PLAIN END (PE)
B. SOLID SLEEVE (SU)
C. DUCTILE IRON PIPE (DIP) SPool (SP)
D. BUTTERFLY VALVE (FLV) AND VALVE OPERATOR WITH 3 IN SQUARE OPERATING NUT
E. VALUE BOX AND COVER PER WATER AUTHORITY STANDARD DRAWING 2326.

PLAN
BUTTERFLY VALVE INSTALLATION DETAIL IN NEW OR EXISTING DUCTILE IRON PIPELINE

<table>
<thead>
<tr>
<th>ABBREVIATIONS</th>
<th>REVISIONS</th>
<th>WATER AUTHORITY</th>
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</thead>
<tbody>
<tr>
<td>DIP = DUCTILE IRON PIPE</td>
<td>JAN. 2011</td>
<td>WATER DUCTILE IRON PIPE</td>
</tr>
<tr>
<td>FL = FLANGED</td>
<td>JUN. 2019</td>
<td>DIRECT BURY BUTTERFLY</td>
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<tr>
<td>MJ = MECHANICAL JOINT</td>
<td></td>
<td>VALVE INSTALLATION</td>
</tr>
<tr>
<td>PE = PLAIN END</td>
<td></td>
<td>DWG. 2358 AUS. 2019</td>
</tr>
<tr>
<td>ST = STEEL</td>
<td></td>
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</tbody>
</table>
**GENERAL NOTES**

1. This detail is to be used for new or existing concrete cylinder pipe only.

2. Prior to construction of repairs or valve installations on existing concrete cylinder pipe, all repair and/or value installation details shall be submitted to, and approved by the Water Authority.

**CONSTRUCTION NOTES**

A. New concrete cylinder pipe (CCP) with flanged end.

B. Ductile iron pipe (DIP) spool (plate)

C. Solid sleeve

D. Butterfly valve (N/A) and valve operator with 3 in square operating nut.

E. Existing CCP with plain end

F. Butt strap + flanged end steel spool. See detail, sheet for butt strap on CCP pipe, and standard drawing 2327.

G. Value box and cover per Water Authority standard drawing 2326.

H. Insulating flange kit, if required.

I. Coat all exposed steel surfaces with an Engineer approved product, or one from the current Water Authority approved products list.

**ABBREVIATIONS**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>CCP</td>
<td>Concrete Cylinder Pipe</td>
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<tr>
<td>DIP</td>
<td>Ductile Iron Pipe</td>
</tr>
<tr>
<td>PL</td>
<td>Flanged</td>
</tr>
<tr>
<td>MJ</td>
<td>Mechanical Joint</td>
</tr>
<tr>
<td>PE</td>
<td>Plain End</td>
</tr>
<tr>
<td>ST</td>
<td>Steel</td>
</tr>
</tbody>
</table>

**WATER AUTHORITY**

**REVISIONS**

- Water Concrete Cylinder Pipe Direct Bury Butterfly Valve Installation
- DWG. 2350
- JAN. 2011
- JUN. 2019
- AUS. 2019
GENERAL NOTES
1. FOR CONSTRUCTION AND DIMENSIONS OF WATER METER BOX AND CONCRETE PAD, SEE STANDARD DRAWINGS 2361, 2362 & 2368.
2. BECAUSE OF LIMITED SPACE, METER BOXES MAY BE ROTATED 90°. CONNECTIONS TO BE MADE PER WATER AUTHORITY APPROVAL.
3. DOUBLE METER BOXES SHALL BE CENTERED ON ADJOINING PROPERTY LINES.
4. DOUBLE METER BOX CONFIGURATIONS SHALL BE USED TO THE EXTENT POSSIBLE.
5. METER BOXES SHALL NOT BE CONSTRUCTED IN DRAWS OF DRAINS, UNLESS AUTHORIZED IN WRITING BY THE WATER AUTHORITY.
6. WHERE METER BOXES EXIST WITHOUT THE DRAINAGE OR DRAINAGE IN PLACE, CONSTRUCTION OF NEW DRAINS AND/OR DRAINAGE SHALL INCLUDE RELOCATION OF THE EXISTING METER BOXES.
7. WHERE CURB AND GUTTER EXISTS WITHOUT SIDEWALK, CONCRETE PAD SHALL BE MOUNTED ABAVEMENT ELEVATION, AND SLOPE MAXIMUM OF 1% TOWARDS CURB AT 2% (MAX) IN COMPLIANCE WITH STANDARD DRAWING 2360.

CONSTRUCTION NOTES
A. CURB
B. BACK OF CURB
C. SIDEWALK
D. METER BOX COVER, SEE STANDARD DRAWING 2368
E. 1/2" EXPANSION JOINT
F. EDGE OF UNCURBED STREET OR GRADED STREET
G. PROPERTY LINE
H. DRIVEWAY
J. CONCRETE PAD, SEE STANDARD DRAWING 2362
K. REBAR CONTINUOUS ALL AROUND METER BOX

TYPICAL INSTALLATIONS 3/4" - 1" METERS
GENERAL NOTES
1. THE METER SHALL BE SET UTILIZING A COPPER-JETTER. COPPER-JETTER HEIGHT 16" FOR 1" METER. 12" FOR 3/4" METER.
2. THE VALVE AND METER RECEPTACLES SHALL BE LOCATED UNDER THE LIJ OPENING. WHERE TWO METERS ARE TO BE INSTALLED IN A SINGLE METER BOX, THE METER RECEPTACLES SHALL BE WITHIN READING RANGE OF THE LIJ OPENING.
3. METER BOX LOCATION SHALL CONFORM TO STANDARD DRAWING 2361.
4. WHEN CONTRACTOR DOES NOT INSTALL METER, CONTRACTOR SHALL PROVIDE REMOVABLE PLUGS FOR END OF COPPER-JETTER.
5. EXISTING CONCRETE SHALL BE SAWCUT.
6. CROSS CONNECTION CONTROL SEE STANDARD SPECIFICATION SECTION 802.3.9
7. THE ORIGINAL TRAP PIECE IS TO BE INSTALLED BY THE CONTRACTOR AND IS TO BE OWNED AND MAINTAINED BY THE CUSTOMER PER WATER AUTHORITY ORDINANCE.

CONSTRUCTION NOTES
A. STREET SURFACE
B. BACK OF CURB
C. METER BOX COVER AND LIJ SEE STANDARD DRAWING 2368.
D. 1/2" EXPANSION JOINT
E. CURB STOP, LOCATE INSIDE METER BOX.
F. SIDEWALK OR DRIVEWAY
G. METER TOP OF METER SHALL BE 12" TO 18" BELOW COVER.
H. CORP STOP
J. MAIN WATER LINE
K. TAPPING SADDLE
L. COPPER SERVICE LINE
M. COPPER JETTER PROVIDE WITH DUAL CHECK VALVE IN PRESSURE ZONES ON 1", 1.5", AND FOR PRIVATE WELLS. SEE SPECIFICATION SECTION 802.3.9 FOR PRIVATE WELL PROVIDERS.
N. TRAP PIECE 3 FT LONG, APPROVED COPPER TUBING WITH A CLEAN CUT AT END AND WITH A TEMPORARY FITS. DUAL CHECK VALVE SHALL BE INSTALLED IN WATER ZONES ON 1", 1.5", AND FOR PRIVATE WELLS. SEE SPECIFICATION SECTION 802.3.9 FOR PRIVATE WELL PROVIDERS.
O. CONCRETE PAD REQUIRED IN ALL AREAS PER SECTION 101. EXCEPT CONCRETE, F' = 3000 psi AT 28 DAYS.
R. #4 REBAR CONTINUOUS ALL AROUND METER BOX.
S. STIMULATOR BAR, USE FOR SINGLE METER ONLY. 12" LONG X 1/2" O.D. GALVANIZED STEEL PIPE.
T. METER BOX LID SHALL BE FLUSH WITH SURROUNDING SIDEWALK.
U. ELECTRONIC MARKER DEVICE (EMD), SEE STANDARD SPECIFICATION SECTION 170.
V. METER BOX PER STANDARD DRAWING 2366.
W. "W" STAMP ON CURB WHERE SERVICE LINE CROSSES.
GENERAL NOTES
1. METER BOX LOCATION WILL CONFORM TO STANDARD DRAWING 2261.
2. THE PRIVACY TAP JACKET IS TO BE INSTALLED BY THE CONTRACTOR AND IS TO BE OWNED AND MAINTAINED BY THE CUSTOMER PER WATER AUTHORITY ORDINANCE.

CONSTRUCTION NOTES
A. STREET SURFACE
B. BACK OF CURB
C. METER BOX OUTSIDE AND IN CURB, SEE DRAWING 2267, COVER FLUSH WITH SURFACE AND CENTERED OVER METER REGISTRATION
D. 1" EXPANSION JOINT
E. CURB STOP, LOCATE INSIDE METER BOX
F. SIDEWALK OR DRIVEWAY
G. METER TOP OF METER TO BE 12" TO 18" BELOW COVER
H. CURB STOP
I. MAINTAIN WATER LINE
J. TAPING SADDLE
K. COPPER SERVICE LINE
L. COPPER SERVICE LINE
M. COPPER FITTINGS PROVIDE WITH DUAL CHECK VALVE IN PRESSURE ZONES 10, 12, AND FOR PRIVATE MELS. SEE SPECIFICATION SECTION 802.3.9 FOR PRIVATE WELL PROVISIONS.
N. TAP JACKET 3 FT LONG, APPROVED COPPER TUBING WITH 1" CURETTE AND WITH A TEMPORARY PLUG. DUAL CHECK VALVE SHALL BE INSTALLED IN METER BOX ON 1" 12" AND FOR PRIVATE MELS. SEE SPECIFICATION SECTION 802.3.9 FOR PRIVATE WELL PROVISIONS.
O. CONCRETE PAD REQUIRED IN ALL AREAS PER SECTION 101. EXTERIOR CONCRETE, FC = 3000 PSI AT 28 DAYS.
R. 94 REBAR, CONTINUES AL AROUND METER BOX
S. STABILIZER BAR, 1/2" X 1/2" LONG GALVANIZED STEEL PIPE
T. METER BOX LID SHALL BE FLUSH WITH SURROUNDING SIDEWALK
U. METER BOX EXTENSION AS REQUIRED
V. ELECTRONIC MARKER DEVICES (EMD). SEE STANDARD SPECIFICATION SECTION 170.
W. 3" TALL "M" STAMP ON CURB WHERE SERVICE LINE CROSSES.
GENERAL NOTES
1. TRACE WIRE SHALL BE INSTALLED ON TOP OF PIPE AS SHOWN IN SECTION A-A ON STANDARD DRAWING 2302.
2. TRACE WIRE SHALL BE FASTENED TO THE NON-PEX PIPE WITH TIES OR PLASTIC TIES AT 6" INTERVALS. USE PLASTIC (CP) TIES TO FASTEN TRACE WIRE TO PEX SERVICE LINES. DO NOT USE ACRYLIC TIE OR PEX SERVICE LINES.
3. TRACE WIRE SHALL BE COLOR CODED BLUE (PNW STANDARDS).

CONSTRUCTION NOTES
A. CONCRETE COLLAR PER STANDARD DRAWING 2461
B. WATER MAIN
C. WATER SERVICE
D. WATER LATERAL
E. TRACE WIRE #12 AND COPPER CHAD STEEL - BLUE FASTENED TO TOP OF PIPE (SEE SECTION A-A STANDARD DRAWING 2302)
F. TRACE WIRE SHALL BE ROUTED AROUND VALVES ON THE NORTH OR EAST SIDE
G. FOR TAPPIING POINTS - IF TRACE WIRE EXISTS ON MAIN LINE, INSTALL TRACE WIRE ON SERVICE LINE AND CONNECT TO MAIN LINE TRACE WIRE WITH 1-WAY LOGGING WATERPROOF CONNECTION. DO NOT CUT MAIN LINE TRACE WIRE (SEE TEE CONNECTION DETAIL STANDARD DRAWING 2302)
H. DRIVE-IN MAGNETIC GROUNDING ANCHOR CONNECT TO TRACE WIRE USING SPLICE CONNECTION (SEE ANCHOR DETAIL STANDARD DRAWING 2302)
I. TIE ON PLASTIC TIE (SEE GENERAL NOTES)
J. TRACE WIRE WITH MIN. 5' OF SPACE BETWEEN PIPE AND GROUNDING AND OR AT SEPTIC-OF-WAY
K. EDGE OF SEPTIC-OF-WAY
L. CONNECT SERVICE/LATERAL LINE TRACE WIRE USING TEE CONNECTION - 1-WAY LOGGING WATERPROOF CONNECTION, DO NOT CUT MAIN LINE TRACE WIRE (SEE TEE CONNECTION DETAIL STANDARD DRAWING 2302)

WATER SERVICE
TRACE WIRE DETAIL
NOT TO SCALE

WATER VALVE - PLAN VIEW
NOT TO SCALE

WATER LATERAL
TRACE WIRE DETAIL
NOT TO SCALE

NOTE
THIS WATER LATERAL DETAIL SHALL BE USED WHERE WATERLINE CROSSES RIGHT-OFF-WAY LINE WITHOUT WATER LATERAL. ALL LINES SHALL BE TRACED TO RIGHT-OFF-WAY WITH GROUNDING AND OR AT SEPTIC-OF-WAY.
GENERAL NOTES:
1 METER BOX LOCATION TO CONFORM TO DWG. 2361.
2 CONSTRUCTION OF METER BOX TO CONFORM TO SECTION 802 FOR WATER METER BOX, 3/4" AND 1" METERS.
3 SEE DWG 2368 FOR METER BOX COVER AND LID.

CONSTRUCTION NOTES:
A PIPE HOLE, 1 AT EACH END, 9 1/4" WIDE BY 3 1/4" HIGH.
GENERAL NOTES
1. TO BE USED IN SIDEWALKS, MOUNTAIN CURB OR IN UNEVEN AREAS.
   COVER
2. MATERIAL: DUCTILE IRON.
3. ROUND ALL EDGES.
4. TOP OF COVER SHALL HAVE AN INTEGRATED CORRUGATED DESIGN TO PREVENT SLIPPING.
   lid
5. MATERIAL: DUCTILE IRON.
6. ROUND ALL EDGES.
7. TOP OF Lid SHALL HAVE INTEGRATED CORRUGATED DESIGN TO PREVENT SLIPPING.
8. TOP OF Lid SHALL HAVE INTEGRATED WORDS "WATER AUTHORITY".
9. Lid SHALL NOT ROCK ON COVER AND SHALL BE EASILY OPENED.
10. THE TOP SURFACE OF THE Lid SHALL BE FLUSH WITH THE TOP OF COVER.

PLAN VIEW
BOX COVER FOR 3/4" TO 1" METERS

SECTION A-A
SECTION C-D
BOTTOM VIEW

SECTION B-B

ENDPOINT CAP AND NUT

SECTION D-D

WATER AUTHORITY
WATER
METER BOX COVER AND Lid
FOR 3/4" TO 1" METERS

REVISIONS

DWG. 2358
JAN. 2013
GENERAL NOTES
1. THIS IS A TYPICAL STANDARD DETAIL TO BE USED AS REFERENCE.
   THE ENGINEER IS RESPONSIBLE FOR DESIGNING AND PREPARING
   DIMENSIONED AND SCALE DRAWINGS SPECIFIC TO A PROJECT,
   USING THE NECESSARY CALCULATIONS AND DEVELOPING
   SPECIFICATIONS TO SUPPORT THE DESIGN AND THE
   ENGINEER'S STANDARD CONTRACT DOCUMENTS.

2. VAULT NOT TO BE PLACED IN TRAFFIC AREAS.

3. THE MINIMUM DEPTH IS 4 FT FROM GROUND TO Top.
   IF VAULT IS CONSTRUCTED IN EXISTING PAVING,
   THEN IT IS AT A MINIMUM DEPTH OF 24" FROM GROUND.
   DESIGN CORRECT GRADE FOR INSTALLATION.

4. PRECAST CONCRETE VAULT MAY BE USED IN LCD OF COAL.
   CONSTRUCTION WITH WATER AUTHORITY APPROVAL. SUBMIT DETAILS
   FOR REVIEW.

5. COMPRESSIVE STRENGTH OF ALL CONCRETE SHALL BE 3000 PSI
   PER EXTERNAL CONCRETE SPEC. SEC. 1011.

6. COMPACT SUBGRADE UNDER 12" EITHER SIDE OF FOOTING TO
   THREE maximum density per ASTM C-1667 TO 8" WIDE GAUGE

7. NO RADIATION TO BE INSTALLED FOR RADIATION WATER USES
   (PARKS, MEDICAL, LANDSCAPING, ETC.)

8. DO NOT CONSTRUCT OR INSTALL WATER PUMP ROOMS OR GODDARD WATER PUMP ROOMS.
   DESIGN CORRECT GRADE FOR INSTALLATION.

9. FOLLOW ALL WATER MAIN INSTALLATION REQUIREMENTS PER WATER AUTHORITY.

CONSTRUCTION NOTES
A. METER LAY LENGTH VARIES WITH METER SIZE AND MAY INCLUDE
   MINING, CHECK VALVE AND STRainer METER ASSEMBLY TO
   BE PROVIDED AND INSTALLED BY THE WATER AUTHORITY.

B. 1" VALVE, 1" BASE VALVE, 1" AIR RELEASE VALVE, 1" AIR RELEASE VALVE SHOULDER
   BE 250 MODEL NO. 15K OR APPROVED EQUAL.

C. D.I. PIPE (FLANGE) LENGTH AS REQUIRED, MINIMUM LENGTH
   SHALL BE 2 TIMES THE PIPE DIAMETER.

D. VALVES (MV), 1" TEE WITH MEGAUCES AND VALVE BOX PER
   STANDARD DRAWING C2328.

E. 90° ELBOW (MV) WITH MEGAUCES

F. MAIN SERVICE LINE MUST BE SUITABLE FOR PIPE FROM MAIN
   DISTRIBUTION LINE THROUGH WATER VAULT PUMP ASSEMBLY.

G. 3/4" TEE WITH MEGAUCES

H. MEGAUCES FLANGE ADAPTER, SERIES 2100 AS
   MANUFACTURED BY EMAX IRON, CHICAGO, IL.

I. MAIN DISTRIBUTION LINE

J. 4" X 6" ALUMINUM FLOOR DOOR WITH SPRING OPEN
   DEVICES, BLOX TYPE JS 75 OR APPROVED EQUAL.

K. ROLL TEE UP AS REQUIRED

L. ROLL 90° ELBOW DOWN AS REQUIRED

M. 3/4" GRAVEL, FILL PER ASTM C33, NO. 57 GRAVEL, 12" DEPTH

N. D.I. PIPE (FLANGE) LENGTH AS REQUIRED

O. FLANGE COUPLING ADAPTER (FCA)

T. 6" CONCRETE FILLED SURFACE POST, TYPICAL OF 4 WHEN
   REQUIRED BY OWNER. SEE STANDARD DWG C2322

REVISIONS
APR. 2015
DWG. 2371

WATER
LARGE DIAMETER METER VAULT
8" TO 12" SERVICE
AUG. 2019
GENERAL NOTES:
1. Method of end closure to be designed to suit conditions.
2. For a metallic carrier pipe (other than ductile iron), contractor shall add corrosion monitoring and protection station per standard drawings 2396, 2397, and 2398.
3. Use fully restrained pipe joints through the casing or use appropriate pipe materials with internal restraints as approved on the current water authority approved products list.

CONSTRUCTION NOTES:
A. Welded steel pipe casing. Diameter and wall thickness to be designed per standard specification section 700 to suit conditions.
B. Bell dia. of carrier pipe.
C. Carrier pipe.
D. Manufactured casing spacer. Installation and spacing per manufacturer's recommendations.
GENERAL NOTES:
1. ENTIRE ASSEMBLY MUST HAVE ADEQUATE THRUST RESTRAINT PER STANDARD DRAWING 2320. CONCRETE BLOCKING SHALL BE INSTALLED ONLY WHEN MECHANICAL RESTRAINT IS NOT POSSIBLE.

CONSTRUCTION NOTES:
A. EXISTING WATERLINE.
B. RELOCATED WATERLINE.
C. NEW LINE.
D. LEAN FILL.
E. LEAN FILL 24" OVER PIPE
F. ELECTRONIC MARKER DEVICE (EMD), SEE COA STANDARD SPECIFICATION SECTION 170.
G. IF ANY EXISTING CCP JOINTS FALL WITHIN 10' OF THE PLANNED CUT, REMOVE CCP TO THE JOINT AND REPLACE WITH DIP.
GENERAL NOTES:
1. HORIZONTAL RPBA INSTALLATION REQUIRED.
2. ABOVE GRADE RPBA INSTALLATION REQUIRED.
3. WATER LINE PRESSURE AND TEMPERATURE MUST NOT EXCEED RATED CAPACITY OF RPBA.
4. PROTECT FROM FREEZING WITH POSITIVE HEAT SOURCE AND INSULATION.
5. MINIMUM RPBA SIZE MUST BE THE BUILDING SERVICE LINE SIZE.
6. DO NOT INSTALL IN FLOOD PRONE AREAS OR IN STORM RETENTION OR DETENTION BASINS.
7. INSTALL WATER HAMMER ARRESTORS & THERMO EXPANSION PROTECTION, AS NECESSARY.
8. METALLIC RISER PIPING REQUIRED.
9. JOINTS TO BE ADEQUATELY RESTRAINED.
10. DEVIATIONS FROM THESE SPECIFICATIONS MUST HAVE PRIOR WRITTEN APPROVAL FROM THE WATER AUTHORITY CROSS CONNECTION OFFICE.
11. THE INSTALLATION OF A BACKFLOW ASSEMBLY MAY CREATE A CLOSED LOOP SYSTEM. THE CUSTOMER IS RESPONSIBLE FOR COMPLIANCE WITH CURRENT PLUMBING CODES WHICH MAY REQUIRE INSTALLATION OF (PRIVATE) PRESSURE RELIEF DEVICES AND/OR EXPANSION TANKS.

CONSTRUCTION NOTES:
A. METER BOX PER STANDARD DRAWING 2362 OR 2363.
B. PROPERTY LINE.
C. SERVICE LINE WITHOUT TAPS OR TEES BETWEEN THE METER AND THE BACKFLOW PREVENTION ASSEMBLY.
D. ADEQUATE SLEEVE & INSULATION. INSULATION SHALL BE (AT MINIMUM) 1" THICK.
E. MINIMUM 4" CONCRETE (3000 PSI) SLAB.
F. UNIONS OR FLANGED FITTINGS INSTALLED A MINIMUM OF 4" ABOVE GRADE.
G. 36" MAXIMUM, 12" MINIMUM (FROM LOWEST POINT OF ASSEMBLY TO TOP OF CONCRETE SLAB).
H. PROVIDE ADJUSTABLE METALLIC SUPPORTS ON UNITS 2.5" AND GREATER DIAMETER (TYPICAL).
I. USC APPROVED RPBA, AS SHOWN
J. PROTECTIVE ENCLOSURE, SEE STANDARD DRAWING 2369 FOR DESIGN CRITERIA.
K. DRAIN: SIZE DRAIN TO HANDLE FULL DISCHARGE OF RELIEF VALVE. DRAIN TO DAYLIGHT. SCREEN RECOMMENDED TO PREVENT RODENT AND INSECT ENTRY.
L. BUILDING SERVICE LINE.
M. RELIEF VALVE.

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<tr>
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<tr>
<td>REDUCED PRESSURE PRINCIPLE</td>
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<tr>
<td>BACKFLOW PREVENTION ASSEMBLY (RPBA)</td>
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<tr>
<td>DWG. 2385</td>
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GENERAL NOTES:
1. DCVA's are not approved for landscape irrigation systems.
2. Horizontal DCVA installation required.
3. Above grade DCVA installation required.
4. Water line pressure and temperature must not exceed rated capacity of DCVA.
5. Protect from freezing with positive heat source and insulation.
6. Minimum DCVA size must be the building service line size.
7. Do not install in flood prone areas or in storm retention or detention basins.
8. Install water hammer arrestors & thermo expansion protection, as necessary.
9. Joints to be adequately restrained.
10. Metallic riser piping required.
11. Deviations from these specifications must have prior written approval from the Water Authority Cross Connection Office.
12. The installation of a backflow assembly may create a closed loop system. The customer is responsible for compliance with current plumbing codes which may require installation of (private) pressure relief devices and/or expansion tanks.

CONSTRUCTION NOTES:
A. Meter box per standard drawing 2362 or 2363.
B. Property line.
C. Service line without taps or tees between the meter and the backflow prevention assembly.
D. Adequate sleeve & insulation. Insulation shall be (at minimum) 1" thick.
E. Minimum 4" concrete (3000 PSI) slab.
F. Union or flanged fittings installed a minimum of 4" above grade.
G. 36" maximum, 12" minimum (from lowest point of assembly to top of concrete slab).
H. Provide adjustable metallic supports on units 2.5" and greater diameter (typical).
I. USC approved DCVA, as shown.
J. Protective enclosure, see standard drawing 2389 for design criteria.
K. Drain: Drain to daylight. Screen recommended to prevent rodent and insect entry.
L. Building service line.
GENERAL NOTES:
1. See manual of procedures for the type of backflow prevention assembly required on private fire protection systems.
2. Horizontal DCDA installation required.
3. Protect from freezing with a positive heat source and insulation.
4. Minimum DCDA size must be the building service line size.
5. Metallic riser piping required.
6. Above grade DCDA installation required.
7. Flanged fittings required. Joints to be adequately restrained.
8. Water line pressure and temperature must not exceed the capacity of DCDA.
9. Install water hammer arrestors & thermal expansion protection, as necessary.
10. Deviations from these specifications must have prior written approval from the Water Authority Cross Connection Office.
11. The installation of a backflow assembly may create a closed loop system. The customer is responsible for compliance with current plumbing codes which may require installation of (private) pressure relief devices and/or expansion tanks.

CONSTRUCTION NOTES:
A. Adequate sleeve & insulation. Insulation shall be (at minimum) 1" thick.
B. Minimum 4" concrete (3000 PSI) slab.
C. 36" maximum, 12" minimum (from lowest point of assembly to top of concrete slab).
D. Pipe spool (optional).
E. Provide adjustable metallic supports.
F. USC approved DCDA, as shown.
G. Protective enclosure, see standard drawing 2389 for design criteria.
H. Drain: drain to daylight. Screen recommended to prevent rodent or insect entry.
I. Building service line.
GENERAL NOTES:
1. PVB'S UNAPPROVED FOR CONTAINMENT PROTECTION, EXCEPT FOR LAWN IRRIGATION SYSTEMS.
2. DO NOT INSTALL IN FLOOD PRONE AREAS OR IN STORM RETENTION OR DETENTION BASINS.
3. DO NOT INSTALL PVB'S > 5' ABOVE GROUND LEVEL.
4. PROTECT PVB'S FROM FREEZING WITH A POSITIVE HEAT SOURCE.
5. HORIZONTAL INSTALLATION REQUIRED AS SHOWN.
6. JOINTS TO BE ADEQUATELY RESTRAINED.
7. METALLIC RISER PIPING REQUIRED.
8. THE INSTALLATION OF A BACKFLOW ASSEMBLY MAY CREATE A CLOSED LOOP SYSTEM. THE CUSTOMER IS RESPONSIBLE FOR COMPLIANCE WITH CURRENT PLUMBING CODES WHICH MAY REQUIRE INSTALLATION OF (PRIVATE) PRESSURE RELIEF DEVICES AND/OR EXPANSION TANKS.

CONSTRUCTION NOTES:
A. METER BOX PER STANDARD DRAWING 2362 OR 2363.
B. PROPERTY LINE.
C. SERVICE LINE WITHOUT TAPS OR TEES BETWEEN THE METER AND THE BACKFLOW PREVENTION ASSEMBLY.
D. ISOLATION VALVE (GATE VALVE OR BALL VALVE).
E. UNIONS, MINIMUM 4" ABOVE GRADE.
F. TEE WITH DRAIN PLUG OR BALL DRAIN VALVE, MINIMUM 6" ABOVE GRADE.
G. USCPAPPROVED PVB, AS SHOWN.
H. SPOOL, 12" MAXIMUM LENGTH.
I. ENCLOSURE, OPTIONAL. SEE WATER STANDARD DRAWING 2389 FOR DESIGN CRITERIA IF ENCLOSURE IS USED.
J. CONTROL VALVE (ELECTRIC OR MANUAL), OPTIONAL.
K. 12" MINIMUM ABOVE ALL DOWNSTREAM PIPING & OUTLETS.
L. SPRINKLER.
HINGED COVER

GENERAL NOTES:
1. ENCLOSURE DESIGN: CONSTRUCTION AND MAINTENANCE IS THE RESPONSIBILITY OF THE CONSUMER. THE DESIGN ENCLOSURES MUST MEET THESE MINIMUM SPECIFICATIONS. CONSUMER MAY SELECT THE USE OF TYPE A, B, OR C ENCLOSURE.
2. INSTALLATION MUST BE PROTECTED FROM FREEZING.
3. ENCLOSURES MUST BE INSTALLED AND MAINTAINED SO THAT UNITS ARE SAFELY & READILY ACCESSIBLE FOR TESTING, MAINTENANCE & REPAIRS.
4. FOR TYPE B ENCLOSURE, THE HINGE MAY BE LOCATED AT OPTION A. OR B. AS SHOWN.
5. ALTERNATE DESIGNS MAY BE USED WITH PRIOR WRITTEN APPROVAL FROM THE WATER AUTHORITY CROSS CONNECTION OFFICE.
6. IF FLOOR DRAIN IS USED, FLOOR SLAB SHALL BE SLOPED TOWARD DRAIN HOLE.

CONSTRUCTION NOTES:
A. USC APPROVED RPBA, DCVA, DCDA OR PVB.
B. DRAIN: DRAIN OF ADEQUATE SIZE TO ALLOW FOR PROPER DRAINAGE. SHIELD IS RECOMMENDED FOR SIDE DISCHARGING RELIEF VALVES. FOR TYPE C ENCLOSURE, SWING CHECK IS RECOMMENDED WHEN DRAINING TO DAYLIGHT.
C. ADEQUATE CLEARANCES REQUIRED FOR TESTING, MAINTENANCE & REPAIR.
D. 5' MAXIMUM FROM HANDWHEEL TO FINISH FLOOR, AS SHOWN. UNITS INSTALLED HIGHER THAN 2', CONSUMER MUST PROVIDE PERMANENT ACCESS PLATFORM/LADDER.

REVISIONS: WATER AUTHORITY
WATER ENCLOSURES
DWG. 2389 JANUARY 2011
GENERAL NOTES:
1. SEE STANDARD DRAWINGS 2385, 2386 AND 2387.
2. THE INSTALLATION OF A BACKFLOW ASSEMBLY MAY CREATE A CLOSED LOOP SYSTEM. THE CUSTOMER IS RESPONSIBLE FOR COMPLIANCE WITH CURRENT PLUMBING CODES WHICH MAY REQUIRE INSTALLATION OF (PRIVATE) PRESSURE RELIEF DEVICES AND/OR EXPANSION TANKS.

CONSTRUCTION NOTES:
A. METER BOX PER STANDARD DRAWING 2362 OR 2363.
B. PROPERTY LINE.
C. SERVICE LINE WITHOUT TAPS OR TEES BETWEEN THE METER AND THE BACKFLOW PREVENTION ASSEMBLY.
D. USC APPROVED RPBA, DCVA OR DCDA.
E. ADEQUATE CLEARANCE REQUIRED FOR TESTING & MAINTENANCE.
F. PROTECTIVE ENCLOSURE. SEE STANDARD DRAWING 2389 FOR DESIGN CRITERIA.
G. PIPING AND FITTINGS MAY BE ABOVE OR BELOW GRADE.
H. GATE VALVE WITH HAND WHEEL.
GENERAL NOTES:
1. If metered multi-use system is used, the RPBA must be the first connection from the meter. No taps will be allowed between the meter and the RPBA.
2. The backflow prevention assembly may be installed indoors or outdoors.
3. It is the responsibility of the customer to adequately size the meter for the service to sustain simultaneously the private fire protection system and the domestic water demands. The meter should be appropriately sized to accommodate low (domestic) and high (fire + domestic) flows.
4. The installation of a backflow assembly may create a closed loop system. The customer is responsible for compliance with current plumbing codes which may require installation of (private) pressure relief devices and/or expansion tanks.

CONSTRUCTION NOTES:
A. Water main.
B. Meter.
C. Curb and gutter.
D. RPBA.
E. Unmetered fire line.
F. Service line for domestic fire.
G. Domestic service line.
H. Private fire hydrant.
I. Building structure.
J. Internal fire protection system.
K. Public gate valve per standard drawing 2326.
L. Private valve to be owned and maintained by the customer.
M. Meter with dual check valve (private) to be owned and maintained by the customer.

REVISIONS:
WATER AUTHORITY

WATER
RESIDENTIAL WATER PRIVATE FIRE PROTECTION SYSTEMS

DWG. 2394
JANUARY 2011
GENERAL NOTES:
1. There shall be no taps or tees between the hydrant and the RPBA.
2. In all cases, a fire hydrant meter must be used at all times.
3. Fire hydrant meter permit must be present with the meter at all times.
4. Only approved hydrants can be used as stated in the fire hydrant meter permit.

KEY NOTES:
A. Fill pipe. Permanently mounted on tank. See fill pipe detail.
B. Air gap. Air gap is twice the diameter of fill pipe above flood rim.
C. Hose connection.
D. Flood rim.
E. Fire hydrant meter.
F. USC approved RPBA.
G. Supports required.

RPBA = Reduced Pressure Backflow Assembly
NOTES:
1. HARDWARE QUANTITIES IN INSULATING FLANGE KIT WILL VARY BASED ON GASKET PATTERN AND PIPE SIZE.
2. SEE SPECIFICATIONS FOR ISOLATION GASKET, SLEEVE AND WASHER MATERIALS.
3. FOR CONNECTIONS TO FOREIGN INSTALLATIONS, INSTALL SINGLE-WASHER KITS WITH THE ISOLATING WASHERS ONLY ON THE FOREIGN SIDE OF THE FLANGES.
4. FOR NON-FOREIGN INSTALL DOUBLE WASHER KITS WITH ISOLATING WASHERS ON BOTH SIDES OF THE FLANGES.
5. DO NOT APPLY METALLIC OR OTHER NON-INSULATING PAINTS TO INSULATING PARTS OR OTHER EDGES OF FLANGES.
6. INSULATING SLEEVE TO BE 1/64" SHORTER THAN DISTANCE BETWEEN SST WASHERS WHEN BOLT IS FULLY TIGHTENED.

ABBREVIATIONS:
- THHN = THERMOPLASTIC HIGH HEAT-RESISTANT NYLON
- AWG = AMERICAN WIRE GAUGE
- HMW/PE = HIGH MOLECULAR WEIGHT POLYETHYLENE
- SST = STAINLESS STEEL
1) File structure to bare metal and clean surface.
2) Strip insulation from wire and attach sleeve.
3) Hold mold firmly with opening away from operator, ignite with flint gun.
4) Remove slag from connection with chipping hammer.
5) Cover connection with bitumastic coating over all exposed metal.

EXOTHERMIC WELD DETAIL

2 WIRE TEST STATION

INSTALL BONDING JUMPERS EQUALLY DISTANT

LYTHERM FILLER STRIP

CAST-IRON COVER

20" x 20"

CONCRETE COLLAR

TEST STATION HOUSING

4 WIRE TEST STATION

MATERIAL SPECIFICATION — ASTM A336 (COMMERCIAL QUALITY)

CUT LENGTH — 2 1/2" ± 1/16"
WIDTH — 1 1/4" ± 1/16"

LYTHERM FILLER STRIP TO BE 1" ± 1/2" WIDE TO OVERLAP SIDES OF JUMPER,
CRIMP BONDING JUMPER OVER FILLER AT PT "A" TO COMPRESS FILLER.
1. Engrave label on MCARTA board 3/16" thick min.
2. For casing test stations screen print label 1/2" min. on test station cap.

PROJECT # 6811-03
STATION # XXX+XX

TEST BOARD LABEL

CASING TEST STATION

ABBREVIATIONS:
• THHN = THERMOPLASTIC HIGH HEAT-RESISTANT NYLON
• AWG = AMERICAN WIRE GAUGE

WATER CORROSION MONITORING DETAILS - 3

REVISIONS

WATER AUTHORITY

Dwg. 2398
JANUARY 2011
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<td>2460</td>
<td>PAVING MANHOLE AND VALVE BOX REGRADING</td>
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<tr>
<td>2461</td>
<td>PAVING MANHOLE/VALVE CONCRETE COLLAR DETAIL</td>
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GENERAL NOTES
1. STAVE ADJUSTMENTS TO MANHOLE FRAME AND COVER SHALL BE MADE BY ADJUTING CONCRETE BUCKET COVERS ON CONCRETE ADJUSTMENT RINGS DIRECTLY UNDER THE FRAME. ADJUSTMENTS USING BUCKETS/COVERS MAY BE MADE TO A MAXIMUM DEPTH OF 3-1/2 IN. IF ADJUSTMENTS REQUIRE DEEPER THAN A 3-1/2 IN. DEPTH, THE INLET PIPE ADJUSTED AND COVER REPLACED. ANY BUCKETS USED MUST BE CONCRETE STEEL ADJUSTEMENT RINGS AND GROUT ARE NOT ACCEPTABLE TO USE FOR HEIGHT ADJUSTMENTS.
2. ALL MATERIALS MUST COMPLY WITH THE CURRENT WATER AUTHORITY OR CITY APPROVED PRODUCTS LIST.
3. ALL CONCRETE INTERCEPTORS, INSTALLATION OF BUCKETS AND THE INSTALLATION OF CONCRETE WATER MAIN, CONCRETE STEAM MAIN OR STEAM MAIN COATED CORRUGATED METAL PIPE FOR VALE CARDS, SHALL BE CONSIDERED INCIDENTAL TO THE MANHOLE COVER.
4. ALL RINGS AND COVERS WILL BE REQUIRED IF CURRENT RINGS AND COVERS DO NOT MEET CURRENT SPECIFICATIONS.
5. INSTALLATION MUST COMPILY WITH THE FOLLOWING STANDARD DRAWINGS:
   S.1. 2100 = SANITARY SEWER MANHOLE COVER
   S.2. 2200 = STORM MANHOLE COVER
   S.3. 2195 = VACUUM SEWER VALVE RINGS AND COVERS
   S.4. 2310 = WATER MANHOLE COVERS
   S.5. 2320 = WATER RINGS AND COVERS
   S.6. 2330 = VACUUM RINGS AND COVERS
6. TO ENSURE THE SPECIFIED QUALITY OF CASTINGS WILL BE GUARANTEED, ONLY CASTINGS MANUFACTURED IN THE UNITED STATES OF AMERICA WILL BE ACCEPTABLE.
7. ELECTRONIC MARKER DEVICE (EMD), PLACEMENT MUST COMPLY WITH THE FOLLOWING:
   7.1. SANITARY SEWER MANHOLE = END SHALL BE PLACED 1 FOOT UPSTREAM OF THE MANHOLE OVER THE WY.
   7.2. WATER MAIN AND SANITARY SEWER VALVE CARDS = END SHALL BE PLACED 1 FOOT NORTH OR SOUTH (DEPENDING ON DIRECTION) OF THE Valve OVER THE WATER MAIN, WY VACUUM MAIN.
   7.3. VACUUM AND SEWER MAIN = END SHALL NOT BE PLACED AT VACUUM OR SEWER MAIN

CONSTRUCTION NOTES
A. CONCRETE ADJUSTMENT RINGS OR CONCRETE BUCKETS, MAX. 24" DEPTH FROM TOP OF MANHOLE TO BOTTOM OF CONCRETE TOP SLAB IN STANDARD DRAWING 2101, OR TOP OF CONCRETE TO BOTTOM OF STANDARD DRAWING 2102.
B. OVERLAY
C. NEW PORTLAND CEMENT CONCRETE COLLAR (C4 = 4000 PSI) PER STANDARD DRAWING 2461. ALL ADJUSTMENTS SHALL BE INSTALLED WITH A NEW CONCRETE COLAR. THE OLD COLLAR SHAL NOT BE REMOVED AND REPLACED WITH PROPERLY. REFER TO STANDARD DRAWINGS 2101, 2102, 2181, 2328, AND 2461 FOR PROPER LAY-OUT VERTIICAL ON THE COLLAR.
D. MANHOLE FRAME AND COVER PER STANDARD DRAWINGS 2108 AND 2310.
E. WATER DRAIN AND COVER VALE CARDS PER STANDARD DRAWINGS 2128, 2328, 2380, AND 2330.
F. CONCRETE SEWER SEPTUM.
G. SUBGRADE SHALL BE COMPACTED TO 85% (ASTM).
H. ELECTRONIC MARKER DEVICE (EMD). SEE STANDARD SPECIFICATION SECTION 170. END ARE REQUIRED ON ALL WATER AND SANITARY SEWER ADJUSTMENTS. DO NOT INSTALL END ON STORM DRAIN MANHOLE.
I. POLYMER COATED STEEL CORRUGATED METAL PIPE (CMP).
J. WATER OR SEWER LINE.
K. #14 RUBBER PER STANDARD DRAWING 2461.

WATER AUTHORITY &
CITY OF ALBUQUERQUE

REVISIONS
JAN, 2013
JAN, 2015
SEP, 2017

PAVING MANHOLE AND VALVE BOX RERADING

DWG. 2460
MAY 2019
GENERAL NOTES
1. ALL MATERIALS MUST COMPLY WITH THE CURRENT WATER AUTHORITY OR CITY APPROVED PRODUCTS LIST.
2. CONCRETE COLLAR SHALL BE PORTLAND CEMENT CONCRETE (F′C = 4000 PSI)

CONSTRUCTION NOTES
A. MANHOLE OR VALVE FRAME AND COVER, SEE WATER AUTHORITY STANDARD DRAWINGS 2101, 2102, 2110, 2328, 2330, 2350.
B. INSTALL CONCRETE ADJUSTMENT RINGS OR CONCRETE BRICKS FOR MANHOLES, INSTALL POLYMER COATED STEEL CORRUGATED METAL PIPE (CMP) FOR VALVE BOXES. SEE STANDARD DRAWING 2460 FOR CONTINUATION.
C. 12" SUBGRADE, 95% COMPACTION (ASTM).
D. PAVING SECTION PER APPROVED DRAWINGS.
E. CONCRETE COLLAR IN PAVED AREAS, TYPICAL INSTALLATION.
F. CONCRETE COLLAR IN PAVED AREAS WITH ASPHALT CAP, TO BE USED WHEN CALLED FOR ON PLANS OR AS DIRECTED BY THE ENGINEER. WATER AUTHORITY APPROVAL MUST BE OBTAINED PRIOR TO INSTALLATION ON SANITARY SEWER AND/OR WATER APPURTEMENTS.
G. CONCRETE COLLAR IN UNPAVED AREAS, SET RING 1" ABOVE GRADE AND SLIVER CONCRETE DOWN AS SHOWN TO 1" BELOW GRADE.
H. SANITARY SEWER MANHOLE INSTALLATIONS SHALL HAVE CONCRETE COLLAR STRAIGHTENED WITH LINE 2 IN DRAINAGE AND DIRECTION ARROWS PER STANDARD DRAWINGS 2101 AND 2102. SEE STANDARD DRAWING 2150 FOR FORESDRAIN SEWER VALVE INSTALLATIONS, AND STANDARD DRAWING 2328 FOR WATER VALVE INSTALLATIONS.
J. ELECTRONIC MARKER DEVICES (EMD) REQUIRED FOR ALL SANITARY SEWER VALVES AND MANHOLES, AND WATER VALVES. SEE STANDARD SPECIFICATION SECTION 170.
K. 6" REBAR FORCED INTO HOLE, EMBRACE 3" TO 4" IN CONCRETE, AND INSTALL 6" TO 8" FROM EDGE OF MANHOLE FRAME OR VALVE BOX RING. PROVIDE 18" IN. OVERLAP AS SHOWN.